

WATERFRONT INDUSTRY STUDY

A Report to:  
SAN FRANCISCO BAY CONSERVATION & DEVELOPMENT COMMISSION

Prepared by:  
GRUEN GRUEN + ASSOCIATES

July 8, 1976



Gruen Gruen + Associates  
564 Howard Street  
San Francisco, Ca. 94105  
(415) 433-7598

## TABLE OF CONTENTS

CHAPTER		PAGE
Summary	SUMMARY OF PRINCIPAL CONCLUSIONS	S-1
I	CURRENT STATUS OF BCDC WATER-RELATED INDUSTRIAL PRIORITY USE AREAS	I-1
II	WATER-RELATED INDUSTRIES	II-1
III	AN ASSESSMENT OF THE EFFECTS OF TECHNOLOGICAL CHANGES ON WATER-DEPENDENT INDUSTRIAL ACTIVITIES	III-1
IV	CRITERIA FOR THE USE OF INDUSTRIAL PRIORITY AREAS	IV-1
V	POTENTIAL NEGATIVE ENVIRONMENTAL IMPACTS OF WATER-RELATED INDUSTRIES	V-1
VI	TOWARD A SYSTEM FOR EVALUATING THE TRADE-OFFS BETWEEN INDUSTRIAL AND ENVIRONMENTAL SITE BENEFITS	VI-1
VII	PLANNING GUIDELINES	VII-1
APPENDICES		
A	PERSONS CONTACTED	A-1
B	BIBLIOGRAPHY	B-1

## SUMMARY OF PRINCIPAL CONCLUSIONS

The study summarized in this report leads us to the following conclusions concerning BCDC's plan for the industrial use of the shoreline:

1. The future demand for industrial use of deep-draft sites by water-related industries will be great relative to the supply of suitable sites. Therefore, deep-draft sites presently designated for priority use by water-related industries in the Bay Plan should be retained in that category.
2. Shallow-draft sites are not as scarce as deep-draft sites. But future technological change may increase the demand for such sites. Non-water-related firms are drawn to deep-draft and shallow-draft shoreline sites by land price and other non-water-related locational attributes. Once roads and utilities to nearby deep-draft sites are put in, such non-water-related demand for shallow-draft sites will increase. Therefore, unless there are rather particularly unusual environmental or other reasons for not doing so in a particular case, we suggest that shallow-draft sites currently designated for use by water-related industries in the Bay Plan be retained in that category. This will leave shallow-draft sites available for water-related users if technology causes the demand from such users to increase. It will also tend to hold down the pressure on deep-draft sites because water-related industries which do not need deep-draft will tend to be diverted to shallow-draft sites by the market.
3. The present physical definition of water-related uses does not reflect the basic factors that determine whether an industry is water-related. Also, the present definition is difficult to use as a criterion in the light of the highly diverse nature of the industries that gain significant benefit from shoreline sites. Therefore, we recommend that the present definition of water-related industry be revised to include a criterion that identifies those industries that gain real economic benefit by being located on the water. As explained in this report, a precise definition that provides such a criterion is provided by the phrase, "to be water-related an activity or firm must gain cost savings or revenue-differentiating advantages, neither of which is associated with land rents or costs, from being located on the bay shore that it could not obtain at an inland location".

4. Changing economic conditions and technologies make it impractical to allocate waterfront sites to specific industries on a once-and-for-all basis in a master plan. However, data from industries wishing to locate on the shoreline can be used to ascertain whether or not they fit the revised definition of a water-related industry. Therefore, special area plans and individual permits can be acted upon on a case-by-case basis so as to maximize the long run economic value of the bay to the region's citizens.
5. In Chapter VI of this report, we have discussed a potential approach to integrating the analysis of the benefits and costs of water-related industrial development of the shoreline with consideration of the environmental values that might be mitigated or lost when such development takes place. We suggest that BCDC conduct further studies of this approach in their planning and permit-analyzing activities.
6. The scarcity of deep-draft sites suggests the importance of encouraging industrial, road and utility development plans that will maximize the potential for shared and expanded access to deep-draft sites. Whenever possible, BCDC should work with local jurisdictions in joint planning efforts that expand the opportunity for access to the water from sites that lay inland of BCDC's 100-foot shoreline jurisdiction.

## I. CURRENT STATUS OF BCDC WATER RELATED INDUSTRIAL PRIORITY USE AREAS

### A. Purpose of This Chapter

This chapter reviews the information we have gathered on the current state of those water-related industrial priority use areas noted in the San Francisco Bay Plan (1969). These areas are referred to according to the map designations established in BCDC's "Resolution No. 16: Fixing and Establishing Priority Use Areas" as follows: #16-Petaluma River/Sonoma County; #18-Mare Island; #20-Vallejo; #23-Benecia Industries; #26-Suisun Slough; #27-Suisun/Montezuma Slough; #28-Collinsville/Montezuma Slough; #30-North Contra Costa; #31-Crockett; #32-Davis Point; #35-Hercules; #39-Richmond; and #82-Hunters Point. Maps 1 to 4 indicate the location of each industry priority area.

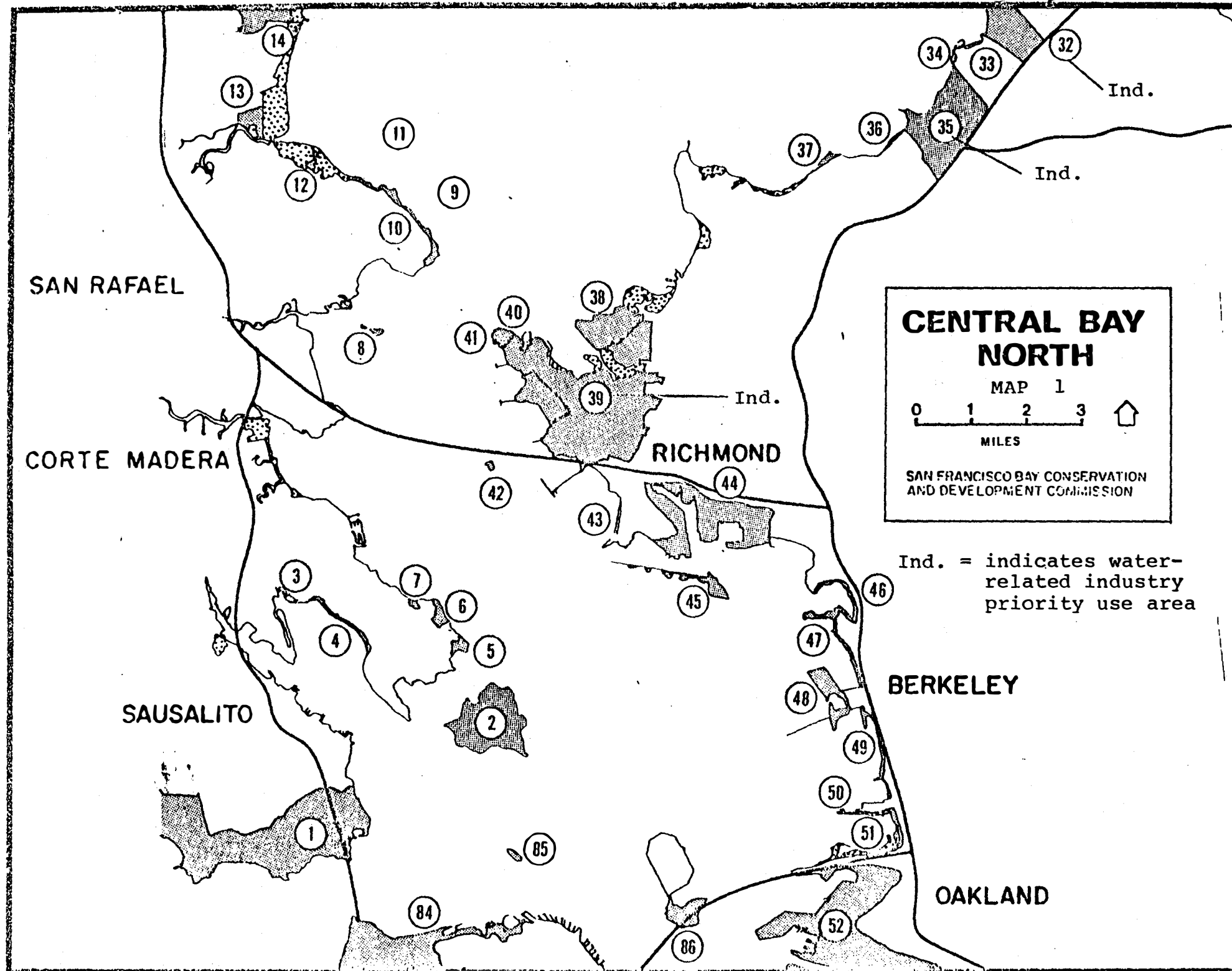
### B. Description and Evaluation of Supply Characteristics: Water-Related Industry Priority Use Areas

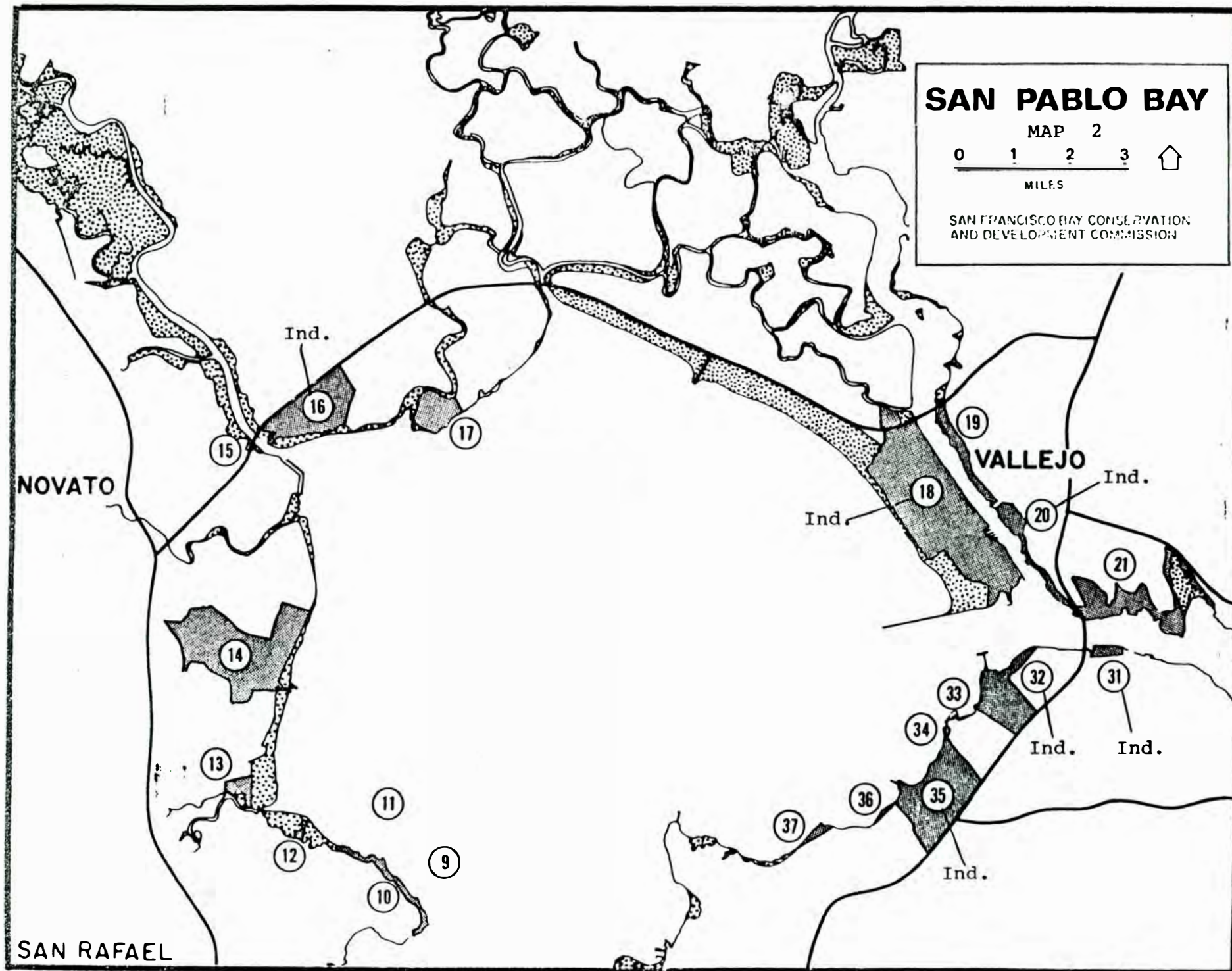
The following section describes each of the water-related industry priority use areas with regard to their current, as well as potential, capabilities and uses. For each vacant portion of the areas designated for water-related industry, we discuss development potentials and limitations based on a review of the following characteristics:

- . Availability of utilities - water, sewer and power
- . Physical characteristics - slope, soils and foundation; i.e., flood level, marsh, mud, fill problems;
- . Water transportation access - channel depth and maintenance, footage of shoreline, pipeline access, existing dock facilities;
- . Land transportation access - rail service, highway, other major roads;
- . Land assembly - ownership, parcel size; and
- . Institutional factors - existing zoning and land use plans and policies which affect site's development.

Each priority area designated by BCDC for water-related industrial use has been analyzed in terms of all factors which affect its potential development. The information was gathered during interviews with planning officials and industrial representatives,\*and from maps and public documents when appropriate. For each area, we will summarize existing development, if any, and comment on factors unique to a particular site, referring to the above-mentioned criteria to provide a basis for evaluating the adaptability of the vacant acreage to water-related industrial use.

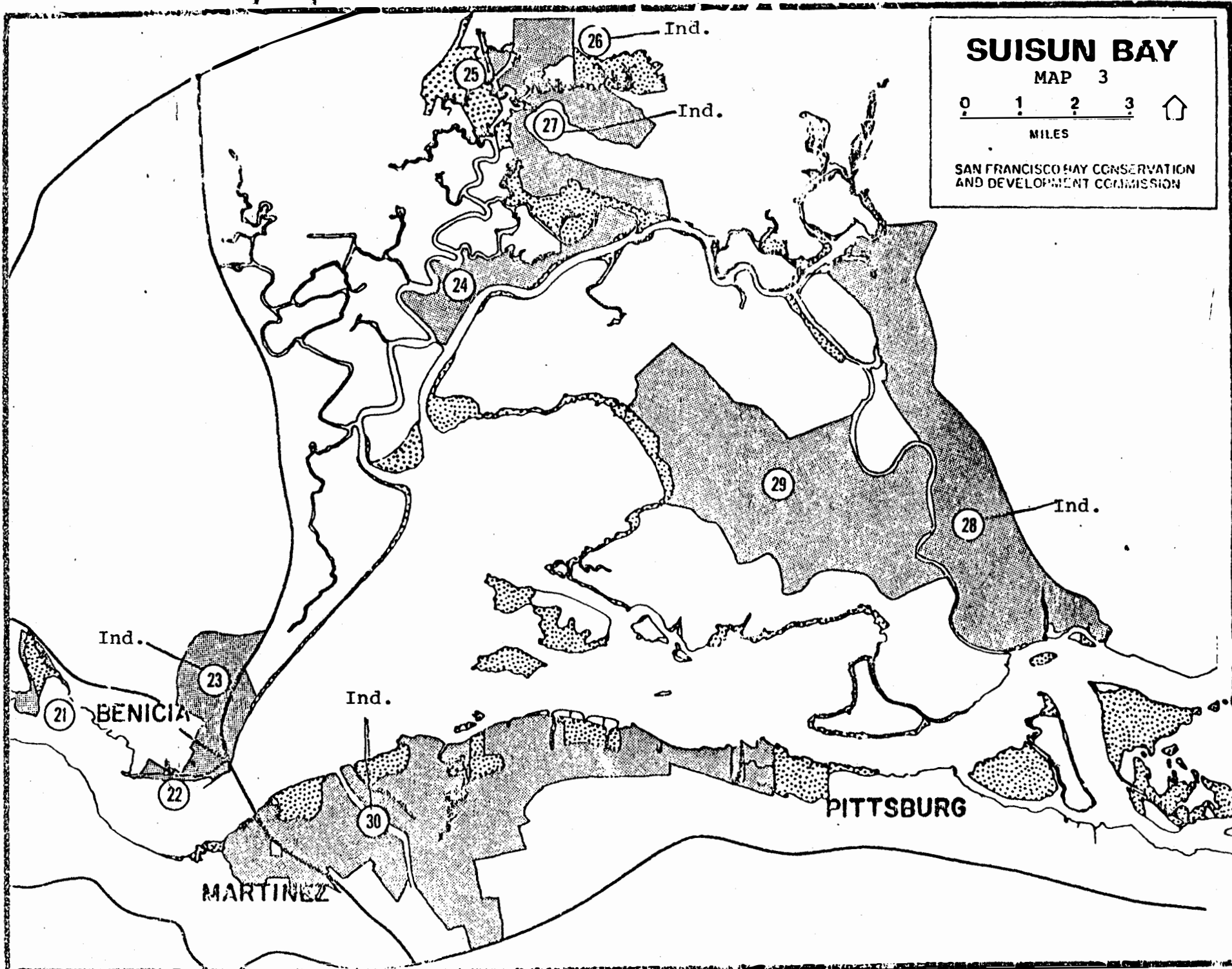
\*A listing of persons contacted is shown as Appendix 1.



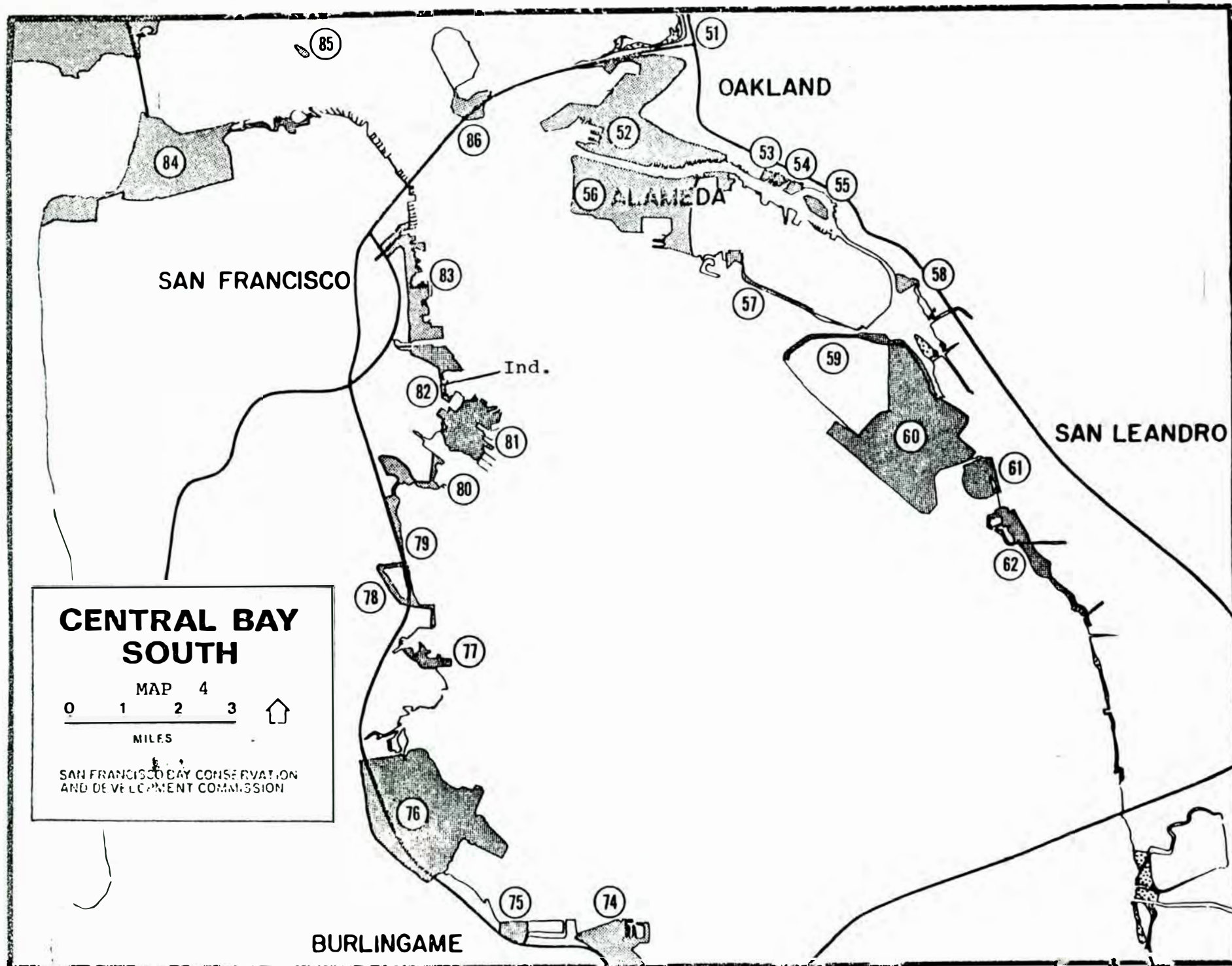


Ind. - indicates water-related industry priority use area.





Ind.= indicates water-related industry priority use area.



### Area #39 - Richmond

Area 39 consists of approximately 1,000 acres in the western section of the City of Richmond. It extends along the bay shore from Point Richmond in the south, along Point San Pablo and north to the Richmond city boundary. Most of this site has been developed by Standard Oil, which operates a 200,000-barrel-a-day refinery at the site. The area also contains a yacht harbor for Standard employees.

There are several usable vacant parcels within the Standard Oil property. Most of these are small sites adjacent to already developed areas. It is very likely that Standard Oil will use these and all vacant areas on their property for expansion of their own facilities. Thus, these areas are not likely to become available for development by other industries.

The other vacant areas extending west on Point San Pablo within area 39 are designated for industrial use in the Contra Costa County Composite Land Use Map. However, they are not likely to be developed, except for tank farms, due to the steep slopes and rugged terrain.

Water, sewer and power supplies to this area are all adequate for development of the vacant parcels. The area is already served by utility connections with sufficient capacity to

supply the large Standard Oil Refinery and, therefore, additional development of whatever small parcels are still vacant would pose no problem.

There are no problems with foundation or other physical characteristics that would impede further development of the Standard Oil property other than the rugged terrain on Point San Pablo mentioned above.

Water transportation access to the area is available by deep water channel and connecting pipelines which are used by Standard Oil for importing crude oil. The Standard Oil property has sufficiently developed water transport access to supply any future development on their property.

Land transportation access is readily available to the area. Standard Oil is served by both Southern Pacific and Santa Fe Railroads, which provide transcontinental service. The refinery is also served by many streets within the site and by Highway 17, a four-lane thoroughfare, which provides a connection with Interstate 80.

The entire Standard Oil site and all of Point San Pablo that is within the boundary of area 39 is designated for industrial use in the Contra Costa County Composite Land Use Plan and is zoned for industrial use by the City of Richmond. The vacant marsh site in area 39 east of Castro Creek and north of Wildcat Creek is designated as open space in the county plan.

In summary, this area is already developed intensively by a water-related industry. The few small developable vacant parcels are likely to be developed by Standard Oil. Other vacant acreage in area 39 is only suitable for tank farm development due to steep terrain or marshes.

### Area #35 - Hercules

Area 35 is entirely within the boundaries of the City of Hercules. It was originally owned by the Hercules Powder Company, which also constructed a company town on the site. Hercules Company sold most of their land some years ago, but still retains a portion of the area. At the present time, Hercules operates a fertilizer factory in the southwest corner of the area. According to town officials, the factory is rapidly becoming economically unfeasible and would probably close in the not-too-distant future.\* The Hercules plant would then become available for some other industrial use. This plant occupies about 60 acres.

The second site that has already been developed is the Sequoia Oil Refinery (owned by Gulf Oil) at the north corner of the area. This property consists of approximately 160 acres. This refinery was shut down approximately two years ago. It is currently up for sale and it is likely that it will be sold in the near future to some company who will utilize the refinery apparatus\*.

\*Interview with Ralph Snyder, City Manager of Hercules, February, 1976.

There are several vacant parcels in area 35. One of the largest is the site just south of the Sequoia Oil Refinery, west of San Pablo Avenue. This property is owned by a British firm, Burmah Oil. This is a suitable site for an industrial facility and the town is actively searching for possible tenants. This site extends from the coastline east to San Pablo Avenue, containing approximately 225 acres.

Another vacant site is the area bounded by San Pablo Avenue on the west, Route 80 on the east, and the Hercules city limit on the north. This site will be developed as a tank farm by PG&E. PG&E has filed an EIR for this site and plans to connect the tank farm with the refinery at the Sequoia Oil site mentioned above by a pipeline.

The remaining vacant acreage of approximately 380 acres is owned by Hercules Company. This site is also suitable for industrial use. The city would like to develop an industrial park on this site.

The provision of utilities in this area is adequate for industrial development, with the exception of sewer connections. At the present time, the area is served by the City of Pinole under contract with the City of Hercules. The Pinole system

\*Interview with Ralph Snyder, City Manager of Hercules, February, 1976.

has a 200,000 gallon a day capacity and is rapidly reaching that capacity now. The City of Hercules plans to circumvent this problem by joining the West County Agency, which would serve the Hercules-Pinole area by contract arrangements with the San Pablo Sanitary District. Therefore, sewer service is likely to be available in the next three to five years and, thus, would not be a restriction on future industrial development.

The Hercules area has few problems with foundation or soils. Most of the area is covered with firm, adobe-like soil. In the central portions of the area, particularly in Refugio Valley east of the Hercules Company plant, the foundation consists of firm alluvial soils and some weak bay mud. The area southeast of the Hercules Company facility has been filled to increase its suitability. Adjacent sites have been utilized by industrial facilities for many years.\* All the vacant acreage is suitable for industrial development; however, the hilly topography may impose some development constraints.

There are no port facilities available in this area and no plans to connect the town with a deep-water channel. The coast off Hercules consists of mud flats of a two-foot depth. The channel is approximately two miles offshore. Thus, any industry on the waterfront would be unable to utilize water transport. There is a dock adjacent to the Hercules fertilizer plant, owned by Sequoia Oil Company, which is now unusable for transport due to the depth of the water.

\*City of Hercules, 1990 General Plan.



Land transportation access to the site is excellent. The area is bounded on the east by Interstate 80 and is bisected by San Pablo Avenue, a four-lane thoroughfare. The parcel is also served by both Southern Pacific and Santa Fe Railroad lines.

All of the sites mentioned above are designated for industrial use in the City of Hercules 1990 General Plan and in the Contra Costa County Composite Land Use Plan. The town is actively seeking industry to develop the vacant sites and to maintain the Hercules Company and Sequoia Oil facilities.

In summary, there are 815 vacant acres within area 35 that are suitable for industrial development. Industrial development would be in conformity with city and county general plans and there are no apparent development limitations. However, any prospective industrial use would not have access to the deep water channel.

#### Area #32 - Davis Point

This area is within the unincorporated section of Contra Costa County. Currently, the area is under ownership of Union Oil, which operates a refinery, and the Dillingham Corporation, which plans to construct a facility for its California Liquid Gas (Cal-Gas) subsidiary. The land which has been bought by Dillingham was previously owned by the American Smelting and Refining Company, which operated a lead smelter.



There is no vacant land under Union Oil's ownership. The vacant portion of area 32 extends northeast from Davis Point to Selby. Cal-Gas plans to develop this vacant site as a liquified petroleum gas unloading marine terminal, tank farm, processing and storage facilities, and rail car and truck loading facility. Cal-Gas is in the process of applying for the necessary permits to develop the site. They have submitted a preliminary proposal to Contra Costa County and an environmental impact report will be prepared some time this year.

The Cal-Gas facility will not occupy all the vacant acreage at the Selby site. According to the Contra Costa County Planning Department, Cal-Gas is interested in leasing or selling part of their site to some other industrial user who could utilize the deep water site. The vacant portion of area 35 is considered the best deep-draft site available for development in the county. The Cal-Gas facility would underutilize the site to a degree that would allow development by another industrial user. It is not known at this time exactly how many acres Cal-Gas will use, or how many will be available for other uses.\* The entire area is designated for industrial use in the County Composite Land Use Plan.

\*Interview with Arnold Jonas, Senior Planner, Contra Costa County Planning Department, February, 1976.

The availability of utilities at the Selby site presents no problem. The former occupant of the land, American Smelting and Refining Company, was a heavy utility user, so that the existing capability of power, water and sewer would be adequate for future industrial development. There is a small sewage settling pond on the site which serves about 12 residences in the area and some accommodation for these residences will have to be made before Cal-Gas constructs its facility.

There are no apparent physical limitations restricting development. The site is fairly level and consists of a very firm foundation. Some areas along the shore have been filled with slag, which also provides a firm base. No problems with foundation are apparent for industrial usage.

Water transportation access is available by deep-draft vessels. Channel depths of 40 feet exist approximately 150 feet from the shore. Cal-Gas plans to construct a fixed pier to accommodate tankers and barges.\*

Land transportation access is provided by the main line of Southern Pacific Railroad. Cal-Gas would utilize rail transport to ship their products. They also plan to use trucks for shipping. Automobile and truck access is provided by a connection with San Pablo Avenue, a four-lane road.

\*California Liquid Gas Corporation, LPG Marine Terminal and Tank Farm Recommendations, June, 1975.

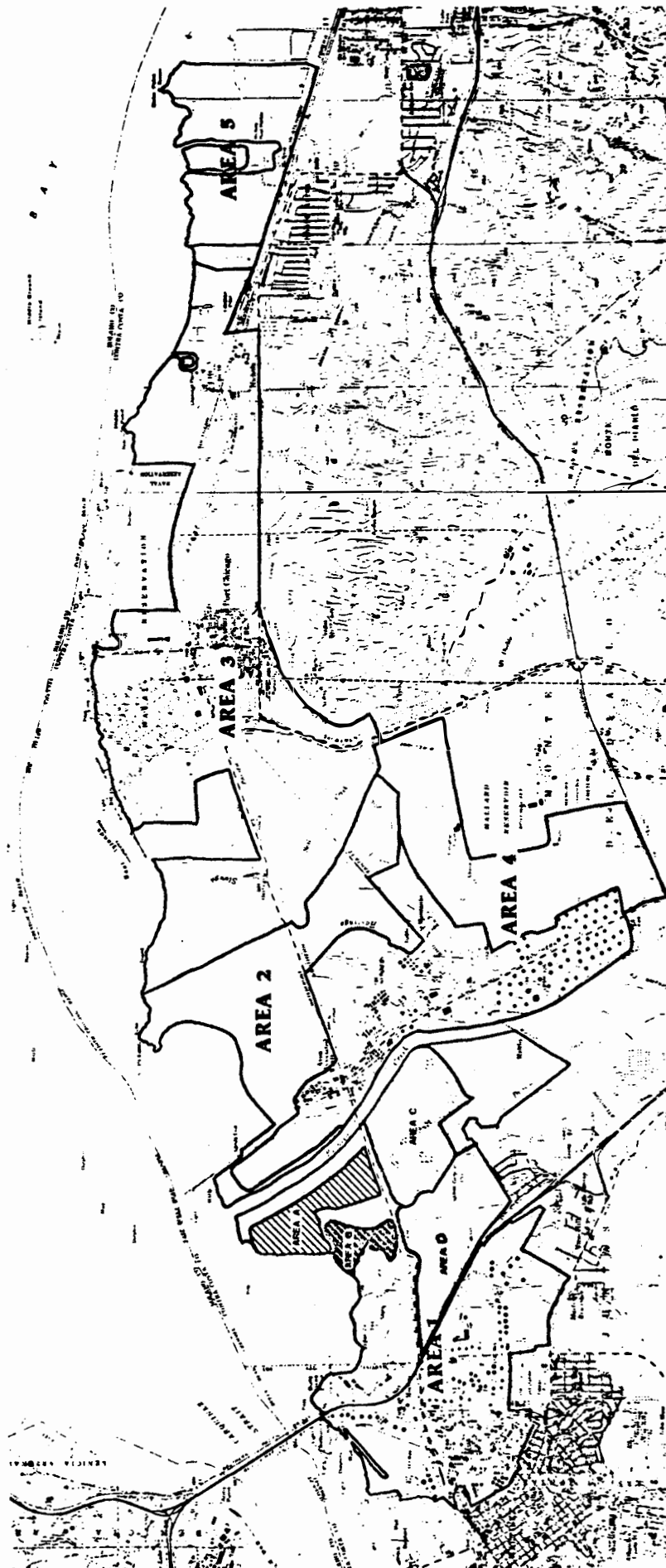
All of the vacant land in area 32 is owned by Dillingham Corporation, of which Cal-Gas is a subsidiary. As mentioned above, acreage that is left unused by the Cal-Gas facility would be leased or sold to some other water-related industrial user. The above analysis indicates the suitability of water-related industrial development on the remaining vacant acreage in this area.

#### Area #31 - Crockett

This is the unincorporated area of Crockett occupied by C&H Sugar Company. C&H processes over a million tons of sugar at this refinery each year, and is one of the largest operations of its kind in the country. There is no developable land in this area. C&H is planning a minor expansion, but otherwise the area is not likely to be further developed.

#### Area #30 - North Contra Costa

This is the largest area in Contra Costa County that is designated for water-related industrial use. The description of vacant land in this priority use area, as shown on Map 5, has been divided into five sections as follows: (1) the parcels within the sphere of influence of the City of Martinez; (2) the area between Pacheco Creek and Port Chicago; (3) lands within Concord Naval Weapons Station; (4) land area south of Concord Naval Weapons Station adjacent to Mallard Reservoir; and (5) parcels in the vicinity of Stake Point. The suitability of vacant acreage in each of these divisions will be discussed separately.



MAP 5

Vacant Land Area #30 North Contra Costa

(1) Parcels Within the Sphere of Influence of the City of Martinez:

Within the sphere of influence of the City of Martinez, there are four vacant parcels that fall within the boundary of area 30. The parcels are all zoned for heavy industry and are within the Martinez Environmental Conservation District. This means that industrial development is encouraged in this area, although some special regulations regarding environmental impact are enforced. These areas are shown on Map 5 and indicated below:

- a) the section adjacent to Pacheco Creek and north of the Southern Pacific Rail line;
- b) the site just west of (a) above, extending along the rail line west to approximately the old Martinez city limit;
- c) the Acme Fill site along Pacheco Creek south of the Southern Pacific line; and
- d) the Shell Oil Company property.

The first site, north of the S.P. rail line along Pacheco Creek consists of approximately 150 acres. It is currently owned by United Towing Company except for approximately 20 acres owned by the City of Martinez and leased to an auto wrecking firm. This parcel is available for development. Physical characteristics are such that no heavy industry could locate without extensive piling or foundation work. The site consists largely of hydraulic fill, having very weak support capability. The site was formerly marsh land. The City of Martinez had a study of the land characteristics done by Harding-Lawson Associates of San Rafael. The land owned by the towing company

contains both a flood easement and deepwater outfall for a sewage treatment plant. This site is zoned ECD-HI-P (Environmental Conservation District, Heavy Industry, Prezoned).

Area (b), west of the United Towing site, is owned by the Urich Oil Company (UCO). It consists of 60 acres. This site is planned to be developed by UCO. The site is currently occupied by four 500,000 barrel fuel oil storage tanks and a gasoline blending and storage terminal. UCO plans to build a refinery when economic conditions permit, the exact size has not yet been determined.

Area (c), south of the Southern Pacific rail line, along Pacheco Creek, is the Acme Fill Corporation. This land is used for sanitary land fill and will continue in such use during the foreseeable future. The land fill operation is not expected to be completed until 2025.

Area (d) is owned by Shell Oil Company and is zoned for heavy industry. This vacant area is being held for the future expansion of the Shell manufacturing complex. There are no present plans for expansion.

(2) The Area Between Pacheco Creek and Port Chicago:

Area 2 lies between Pacheco Creek and the Port Chicago boundary. Area 2 is not suitable for development. It consists entirely of tidal marshlands which provide inadequate foundation for construction. This area is designated as open space in the Contra Costa County Composite Land Use Plan.

(3) Land Within Concord Naval Weapons Station:

East of Pacheco Creek, area 30 includes large parcels of vacant land within the confines of the Concord Naval Weapons Station at Port Chicago. It is likely that the Naval Weapons

Station will continue in its present use as a major naval out-loading facility to the Pacific. According to U. S. Navy officials\*, there are no existing plans, nor are there likely to be any plans in the foreseeable future, for converting the naval facility to some other use. In conclusion, it appears highly unlikely that this site will be declared surplus by the military; therefore, there is little possibility of this area being developed by a water-related industry in the foreseeable future.

(4) Land Area South of Concord Naval Weapons  
Station Adjacent to Mallard Reservoir

There is an additional vacant site in area 30, adjacent to the Lion Oil Company refinery on Pacheco Creek. This parcel is situated between the existing refinery and Mallard Reservoir, north of Arnold Industrial Highway and south of the Santa Fe Railroad line. This parcel consists of approximately 870 acres.

Water, sewer and power connections do not presently exist at the site. However, due to the proximity of the Phillips Petroleum refinery, which has adequate capability in all utilities, this would not be a problem for potential developers.

The physical characteristics of the site present some problems, but not insurmountable ones. The foundation consists largely of alluvial flood plain deposits of low support capability. Portions of the site consist of mud and marsh land. According to Darwin Myers, Geologist in the Contra Costa

\*Based on conversation with Mr. Al Campaglia, Public Affairs Officer, Naval Weapons Station, Concord; February, 1976.

County Planning Department, this would make industrial construction more expensive, but not impossible. The site is within the Concord Fault Special Studies Zone and construction of industrial buildings would, therefore, have to comply with the regulations that apply to the fault zone.

There is no water transportation access to the site. The closest access is the wharf just east of the mouth of Pacheco Creek, which is used by the Lion Oil refinery.

Land transportation access is provided by Southern Pacific, Santa Fe and Sacramento Northern rail lines, all of which are adjacent to the site. The parcel is also bounded by State highway 4, a two-lane thoroughfare presently being reconstructed to a six-lane freeway. The parcel is owned by Lion Oil Company and is designated for industrial use in the Contra Costa County Composite Land Use Plan.

(5) Parcels Within the Vicinity of Stake Point:

In the vicinity of Stake Point, at the eastern edge of area 30, there is a boat harbor, but no industrial development. This section consists of marshy land, unsuitable for industrial use. The land would not support any heavy industrial structures. Although the southern portion of this parcel is designated for industrial use in the Contra Costa County Composite Land Use Plan, according to county officials the land may be redesignated for residential use.\*

\*Interview with Contra Costa County Planning Department, February, 1976.



## Area #28 - Collinsville/Montezuma Slough

Area 28, the Collinsville/Montezuma Slough area, is a large vacant area that is under consideration for several types of development. Collinsville has historically been looked upon as Solano County's main developable port site. Although there is no industrial activity at the present time, it is expected that this area will become one of the major industrial portions of the county.

The section of area 28 to the east of Collinsville Road is owned by PG&E. This site is one of several in California that are being considered by PG&E for a thermal power plant. Of all the sites being considered, this is the only one that is owned by PG&E. All sites are being studied extensively now, thus a decision as to which one will be used is some years away. If the thermal plant were constructed here, PG&E might ship in large quantities of coal by train and possibly by barge.

There are currently no water or sewage connections at the PG&E property. There are existing transmission lines for electricity and natural gas pipelines adjacent to the property which could be used for power supplies.

There are no apparent foundation problems on the PG&E site, while between one-third and one-half of the area, close to Collinsville, is underlain by bay mud. The area near Collinsville, encompassing about one-half of the site, is in the 100-year flood plain. Farther away from the river the land slopes up gradually and is solid. The site is physically suitable for heavy industry.

The Southeastern Solano County General Plan for 1990 proposes the development of Collinsville into a deep water port capable of handling two million tons of cargo a year and ships of up to 45-foot draft. Water transportation access would be focused at Collinsville. At the present time, there are no docks at Collinsville and the waterfront is used only by small pleasure boats. The inlet at Collinsville is used by a private dredging operation which keeps a few barges there.

Land transportation to the PG&E property is limited. The only road in the area is Collinsville Road, which is incapable of supporting heavy truck traffic. There is no rail service to the site. The nearest rail line is the old Sacramento Northern, west of Collinsville, which is no longer in use. However, land access to the area may change in the near future if a proposed development by Dow Chemical on a site east of the PG&E property is carried out. It is expected that adequate roads and rail connections would be constructed to serve the Dow facility. The road would either be an upgrading of Collinsville Road, connecting to Highway 12, or a new route following the Sacramento Northern grade. It is expected that Dow would construct a rail connection with the Sacramento Northern line which runs through the center of area 28. These developments would obviously alter the accessibility of the entire Collinsville area.\*

The PG&E site is currently zoned for general manufacturing and is designated in the Southeastern Solano County General Plan as a power plant recreation area.

\*Dow Petrochemical Project, Draft Environmental Impact Report, August, 1975.

West of Collinsville in area 28 is a 3,400-acre parcel that was the site for a proposed development by National Steel Company. National Steel planned to construct their western headquarters there, but have abandoned the plan now. There are no other current planned uses for the site. The site extends north to Birds Landing.

There are no water or sewer connections serving the site. Water is supplied to Collinsville through individual wells. There are existing electrical power and natural gas lines crossing the area. There are also several product pipelines which traverse the area. The Southeastern Solano County Plan indicates that water supplies for industrial use will be installed in the foreseeable future. This would affect the suitability of the entire Collinsville vicinity.

A significant part of this area has foundation problems. The area west of the old Sacramento Northern line consists of bay mud and would require a large investment for it to be made usable. That area and some portions of the site east of the rail line are seasonal marshland, inundated by water part of the year. Much of the site lies within the 100-year flood plain. North and east of the marsh and flood plain, the land slopes up gradually and becomes solid and usable and would be capable of supporting industrial development.

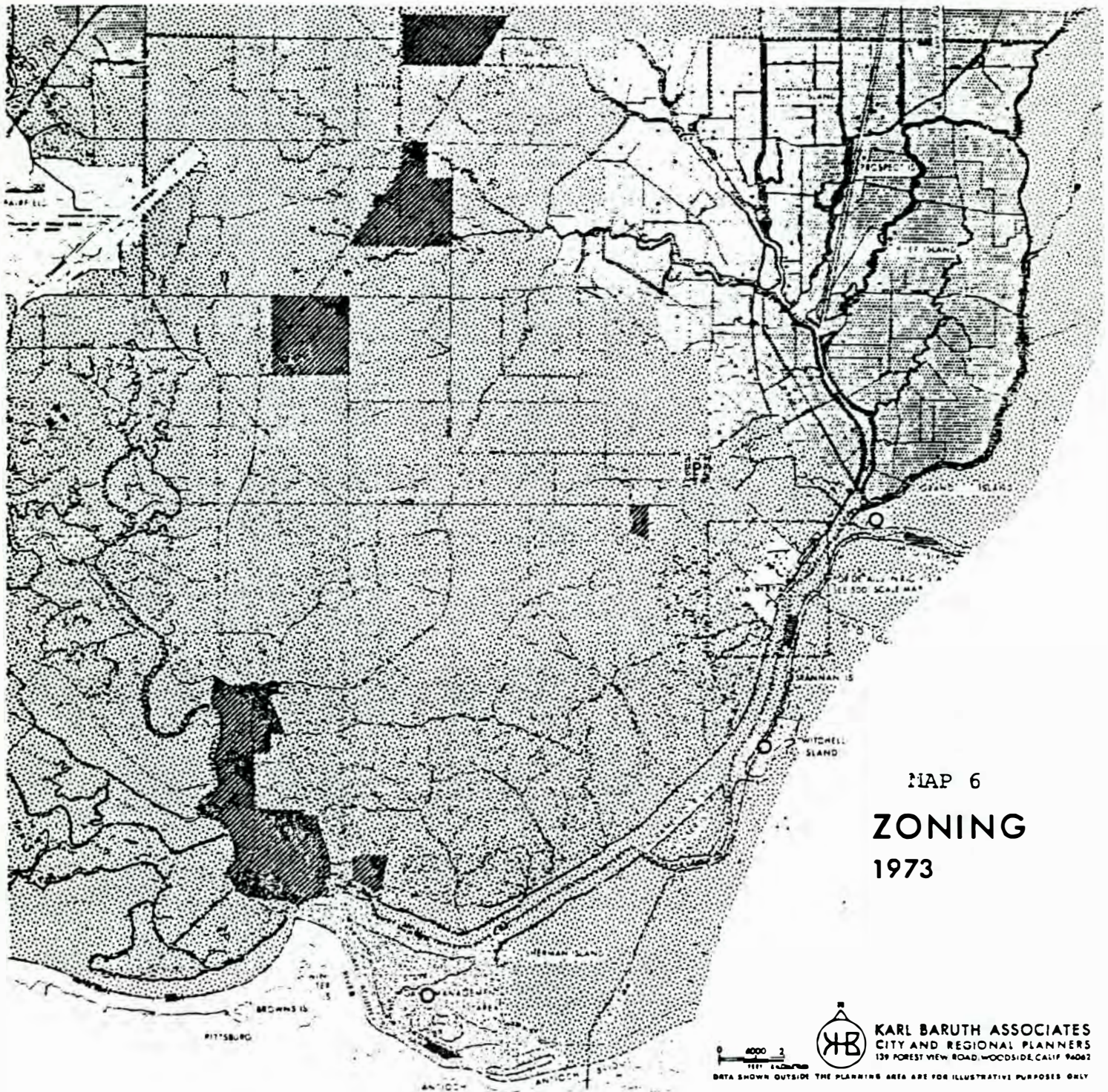
The land and water access to this portion of area 28 are much the same as for the PG&E property discussed above. This portion would also be affected by any access developed in connection with the Dow Chemical facility.

As shown on Map 6, the northern section of this area is currently zoned for agriculture and the southern section is zoned for general manufacturing. Map 7, which indicates future land use, shows portions of the parcel in industrial use and other portions as extensive agricultural and recreation areas.



# SOUTHEASTERN SOLANO COUNTY PLANNING AREA \* CALIFORNIA

## CITY OF RIO VISTA AND SOLANO COUNTY PLANNING COMMISSIONS



MAP 6

### ZONING 1973

 **KARL BARUTH ASSOCIATES**  
CITY AND REGIONAL PLANNERS  
139 FOREST VIEW ROAD, WOODSIDE, CALIF. 94062  
DATA SHOWN OUTSIDE THE PLANNING AREA ARE FOR ILLUSTRATIVE PURPOSES ONLY

#### SOLANO COUNTY:

-  R-E ESTATE RESIDENTIAL
-  A-20 EXCLUSIVE AGRICULTURE
-  A-10 EXCLUSIVE AGRICULTURE
-  C-N NEIGHBORHOOD COMMERCIAL
-  M-G GENERAL MANUFACTURING
-  PARK
-  T TEMPORARILY UNCLASSIFIED

#### SACRAMENTO COUNTY:

-  C-1 LIMITED COMMERCIAL
-  C-O COMMERCIAL RECREATIONAL
-  R-E-2 RURAL ESTATES
-  RECREATIONAL
-  AG-20 & AG-80 EXCLUSIVE AGRICULTURE

#### CITY OF FAIRFIELD:

-  COMMERCIAL THOROUGHFARE

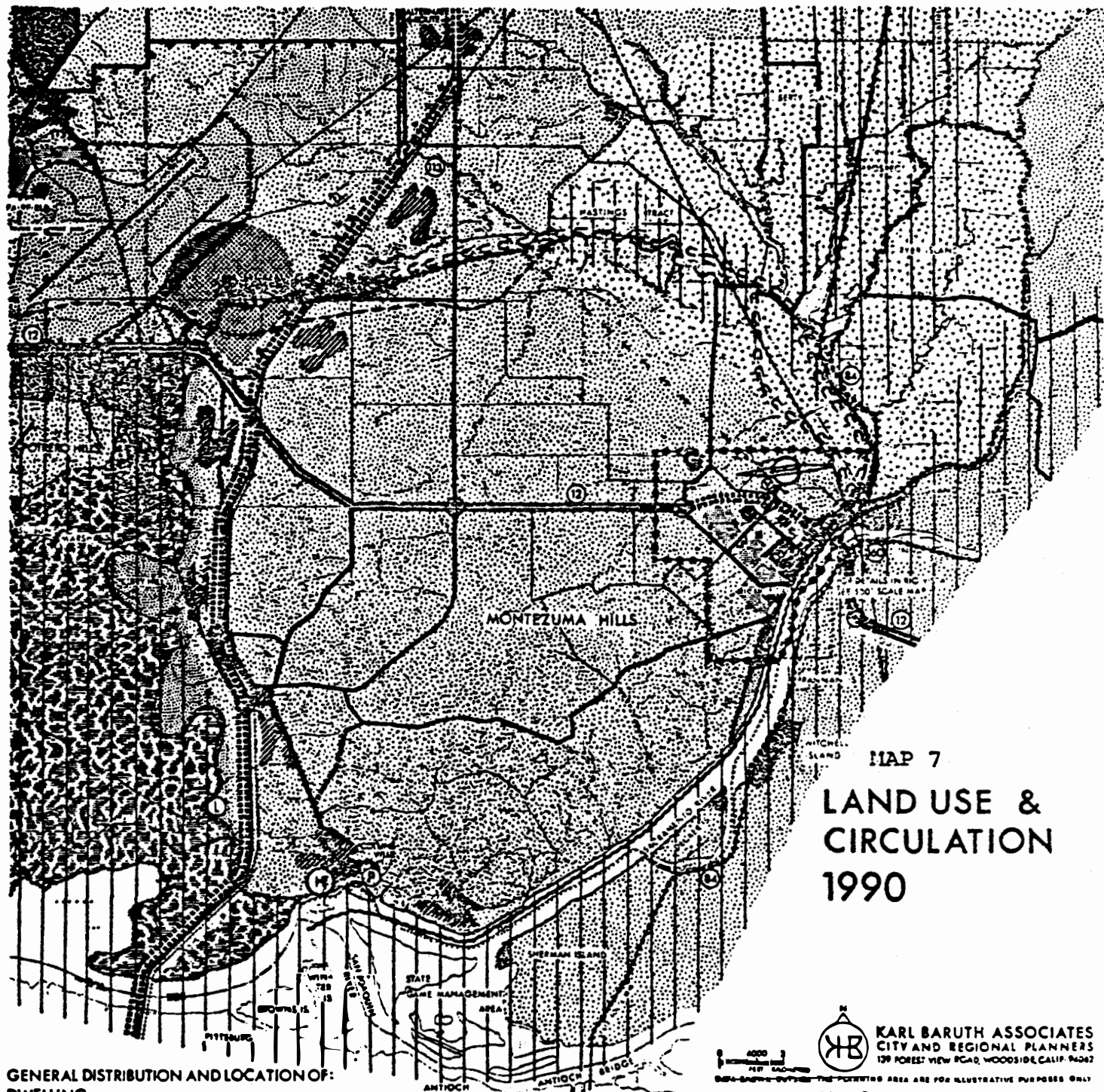
#### YOLO COUNTY:

-  AGRICULTURE



# SOUTHEASTERN SOLANO COUNTY PLANNING AREA \* CALIFORNIA

## CITY OF RIO VISTA AND SOLANO COUNTY PLANNING COMMISSIONS



MAP 7

### LAND USE & CIRCULATION 1990

#### GENERAL DISTRIBUTION AND LOCATION OF:

##### DWELLING

- EXISTING AND PLANNED URBANIZATION
- GOLF AND COUNTRY CLUB COMMUNITY

##### RECREATING

- GOLF COURSE
- POSSIBLE OFFROAD RECREATION VEHICLE AREA
- RECREATION AREAS
- "GOVERNMENT BEACH"
- IMPORTANT HABITAT FOR WATERFOWL & WATER - ASSOCIATED WILDLIFE
- POWER PLANT RECREATION AREA

##### WORKING

- INTENSIVE AGRICULTURE
- EXTENSIVE AGRICULTURE
- GENERAL MANUFACTURING INDUSTRY

##### SERVICING

- PG & E. POWER PLANT
- LIQUID WASTE DISPOSAL PLANT

- DENVERTON CHANNEL
- NORTH BAY AQUEDUCT
- SPECIFIC PLAN AREA BOUNDARY
- SPHERES OF INFLUENCE (5/7/1973):

- RIO VISTA
- SUISUN
- FAIRFIELD

##### LEARNING

- HIGH SCHOOL

##### SHOPPING

- MERIDIAN AIRPORT RELATED COMMERCIAL
- SHOPPING CENTER

##### MOVING

- 1973 FREEWAY ROUTE
- ARTERIALS
- COLLECTORS
- ROAD IN SCENIC AREA
- RIDING, HIKING & BICYCLING TRAILS
- RAIL TRANSIT (FUTURE)
- RAILROAD
- MERIDIAN CIVILIAN AIRPORT
- RIO VISTA MUNICIPAL AIRPORT
- FUTURE POSSIBLE R.V. AIRPORT
- AIRPORT HAZARDOUS ZONES (ESTIMATE)
- COLLINSVILLE HARBOR
- WATERWAY USES
- DEEP WATER CHANNEL
- SCREENING OF INDUSTRY
- EARTHQUAKE FAULTS

The section of Area #28 that lies north of the National Steel site is not currently being considered for development. There are no water or sewer facilities in this section, nor is it likely that any will be constructed in the near future. Gas and electrical lines cross the area, and could provide service to any industrial use. As shown on maps 6 and 7 this area is currently zoned for agricultural use but portions of the site are indicated as both industrial and agricultural use in the land use plan.

Water transportation access to this section could possibly be provided via Montezuma Slough, although there are no existing facilities, and the section has never been developed for water transportation. Montezuma Slough in this reach varies from depths of 10 to 15 feet. Land transportation access could be developed by improving Collinsville Road and/or the old Sacramento Northern rail line, as discussed above. Much of this portion of the site is developable; constraints are the flood plain in the northern part and some moderately erodible soils in the western part.

#### Area #27 - Suisun-Montezuma Slough

Area 27, the Suisun-Montezuma Slough area, is entirely unoccupied. The northeastern part of this area is being considered by the county for a county-wide disposal site. There is currently a smaller disposal site between the northeast corner of area 27 and Highway 12, outside of the area. Several other sites for the garbage disposal site are also being considered and the Planning Department would like to locate the site east of area 27 in Potrero Hills. A decision may not be reached until 1980. No other development is planned for area 27.\*

\*Interview with David Hubbell, Solano County Planning Department February, 1976.

Currently no water or sewer systems serve the area and there are no plans as yet to construct sewer or water systems. If the disposal site were located there, water from wells would provide an adequate supply.

There are no apparent foundation problems in most of area 27 other than the potential of landslides occurring in the steeper area. Some portions of the northern half of area 27 have rather steep grades, with hills rising up to heights of 60 feet. There are several known faults in the area, although none have been historically active. The foundation throughout most of the area is solid non-water-bearing bedrock. Exceptions are the marshy area in the southwest corner of area 27 and a large portion of the lowlying areas highly susceptible to ground shaking or ground failure in cases of earthquake.

Water transport access is available via the Montezuma and Suisun Sloughs. There is a developable site at Beldon's Landing on Montezuma Slough for barge loading. If the disposal site were located in the Potrero Hills, Beldon's Landing would be used as a terminal for garbage carrying barges. The solid waste would then be transported overland by a conveyor system. Land access to the area is via Grizzly Island Road, which is not capable of supporting heavy truck traffic. There is no rail access to the area.

The area is designated as open space in the Solano County Plan, with a combination of recreational and agricultural uses. The area is divided into several large parcels held in private ownership. The Fish and Game Department is in the process of purchasing the land south of area 27 extending to Cutoff Slough.

## Area #26 - Suisun Slough

This area is entirely vacant. There are no proposals for development. The northwest quarter of the parcel, west of Grizzly Island Road, is being annexed by Suisun City. This annexed land will probably be zoned for residential use. An EIR for the annexation has been filed with the county.

The area is not currently served by water or sewer services. Current plans indicate that this area could be served through hook-ups with Suisun City systems which have adequate capacity.\* Electrical power would not be a problem for future development since the area is bisected by a major PG&E transmission line.

The suitability of area 26 for water-related industrial use would be determined by several factors. Probably the most important is the problem of foundation. The area is composed of bay mud and is subject to a high degree of liquefaction. It thus provides a very poor foundation. Related to this factor is the flood hazard found throughout this area.

The Army Corps of Engineers is undertaking a flood control project in the area north of area 26 on the north side of Highway 12. This would not affect the floodwater problem in area 26, except possibly to aggravate it. A study done for Lawler Ranches, an owner, mentions the possibility of increased floodwater in the area caused by the Corp of Engineer's flood control project. This study also states that it would be possible to eliminate the problem of flooding in the area, although they do not outline a specific solution.

Accessibility by water transportation is provided by Suisun Slough, on the western boundary of area 26. This slough is dredged to a depth of 15-20 feet and is navigable up to Suisun

\*Interview with David Hubbell, Solano County Planning Department, February, 1976.



City. There is a fair amount of barge traffic that uses the slough. Water traffic is limited to barges or other shallow draft vessels. At the present time, most of the barge traffic consists of airplane fuel destined for Travis A.F.B. or garbage barges. There are no existing docking facilities in area 26, although some docking sites exist at Suisun City adjacent to area 26.

Land transportation access would be provided by Highway 12 which forms the north boundary of area 26 and Grizzly Island Road, which bisects the area from north to south. Highway 12 is suitable for truck transportation, but Grizzly Island Road is a small, poorly maintained road. The nearest rail line is the Southern Pacific line which serves Suisun City. Land transport within area 26 via existing thoroughfares is thus somewhat limited.

Land assembly in this area might be difficult since there are a number of parcels in private ownership. Lawler Ranches of San Francisco is a major owner in the northeast section of the area.

In the Solano County General Plan, area 26 is designated for a combination of residential, recreational and agricultural usage. The top portion (approximately) north of the PG&E transmission line is zoned for "very low density residential." The area along Suisun Slough is designated as having "recreation potential" and the rest is designated as "extensive agricultural."

## Area #20 - Vallejo

Area 20 is part of the South Vallejo Industrial Park, City of Vallejo redevelopment project. The area is zoned for industrial use. Area 20 is almost all leased to industrial users, with the exception of some vacant acreage in the lower portion of the area. Some of the vacant acreage is owned by Southern Pacific Railroad, but the City of Vallejo is in the process of buying that land and would lease it to industrial users.\* Current tenants within the occupied portion of area 20 include:

- Kaiser Steel, which manufactures drilling rigs;
- Peter Kiewit and Sons, a large marine contractor;
- West Transportation, a trucking firm; and
- Sperry Mills, a flour company.

The total vacant acreage in the area is approximately 8.8 acres of land and 6.6 acres under water. The acreage under water would have to be dredged or filled to be of use. There are foundation problems in regard to the 8.8 vacant acres. This site consists of mud, and would support only light buildings.

Water and sewer supplies to the vacant acres present no problem. There is no water on the site at present, but it could be provided at an insignificant cost.

Water transportation is available to area 20 via the Mare Island Strait, which is dredged to a depth of 36 feet twice a year by the Army Corps of Engineers. The channel is dredged as

\*Interview with Ted A. MacDonell, Assistant City Manager, City of Vallejo, February, 1976.

far north as the Highway 37 bridge at the mouth of the Napa River. Land transport is available by easily accessible highway and railway.

#### Area #18 - Mare Island

It is likely that developed and vacant portions of Mare Island will continue to be under the ownership and use of the U. S. Department of Defense. According to U.S. Navy officials\*, there are no existing plans, nor are there likely to be any plans, in the foreseeable future for utilizing Mare Island for uses other than the U.S. Navy or other U. S. Department of Defense facilities. In conclusion, it is highly unlikely that this area would be available for development by a water-related industry in the foreseeable future.

There is one area in Mare Island that will become available for non-water-related industrial use in the near future. This area is shown on the USGS map as Guadalcanal Village. This area, which consists of 55 acres, and also 30 acres south of Guadalcanal Village across Highway 37, have been declared surplus land by the Federal Government (GSA). The City of Vallejo intends to buy this land and make it available for industrial use. The city plans to incorporate these areas into its existing redevelopment project.

There are no buildings on the Guadalcanal site, and scattered buildings on the south side of Highway 37. There are some problems with water and sewer as no facilities currently serve the site. According to city officials\*\*, it would cost

\*Based on conversations with Lt. J. J. Matthews, Public Works Officer, Mare Island Naval Support Activity Command and Ms. Calvert, Public Affairs Officer, Mare Island Naval Shipyard Command, February, 1976.

\*\*Interview with Ted A. MacDonell, Assistant City Manager of Vallejo, February, 1976.

\$700,000 to pipe in these services unless a hook-up can be arranged with Navy facilities.

There are foundation problems within this area similar to those in area 20. The site consists of mud that is unable to support heavy industry. City officials envision future uses such as commercial warehousing. The site is not zoned yet, but it will be zoned for industrial use by the city of Vallejo.

These sites would not be suitable for water-related industry, since there is no direct access to the water channel or existing pipeline in the area, and foundation problems restrict industrial intensity.

#### Area #23 - Benicia Industries

Area 23 consists of Benicia Industrial Park, and a small parcel west of the Industrial Park. Benicia Industrial Park consists of approximately 90 tenants who range from heavy manufacturing to warehousing and storage. It is owned and operated by Benicia Industries, Incorporated, and constitutes the major industrial concentration in southern Solano County.

Currently the Industrial Park contains 1,500 acres of developed facilities and 700 vacant, usable acres. There are also 1,000 vacant acres unsuitable for development because of steep terrain. Altogether the park has 1,800,000 square feet of usable floor space in its existing buildings (excluding the Exxon facility). There are also several older buildings not included in the above figure that would require some remodeling before they would be suitable for use.

Currently, gas and electric, water and sewer service to the site are all adequate. However, the water supply is such that another major water-using tenant might not be able to be

accommodated by the existing system. However, there would be no problems regarding the future provision of water and other utilities, nor are there any physical characteristics of the site which would limit its development by industrial users.

Benicia Industrial Park contains a deep-water port. There are three berths, which now handle about 100,000 tons of automobiles and 300,000 tons of coke annually, plus a few other miscellaneous products, and the Exxon traffic of crude oil (fairly small) and finished products (substantial).

Land transport access is available via Interstate Highways 680 and 780. Rail service is provided by Southern Pacific line. Service by truck and rail is thus adequate for any future development. The industrial park is zoned for industrial use by the City of Benicia.

The remainder of area 23 is a small industrial complex operated by Isobar, Incorporated. This property consists of about 31 acres, of which 4 are underwater and 5 are unusable mud flats. The site has about 1,100 feet of waterfront, including a small inlet that was formerly used and maintained as a barge basin. The depth of water in the basin was 16 feet at one time, but the extensive silting in the area has decreased the depth to about 2 feet. The site is on the inside of the curve made by the channel around Benicia Point, and this situation, coupled with the fact that the site is also in the lee of the break-water at Army Point in Benicia Industrial Park, explains the heavy silting that affects the area.

There are approximately 11 acres vacant on the Isobar property. While many potential users have looked at the property in the past three years, the many regulations applying to waterfront

construction and the silt problem have generally discouraged tenants according to the management.\* It is estimated that it would cost at least \$1 million to dredge the barge basin to a usable depth. Isobar, Inc. has no plans for constructing a deep water facility (16 feet is the desired depth) but would like to see the property developed as an auxiliary to deep draft vessels, accommodating barge traffic.

The capacity for all utilities greatly exceeds current demand. All power, water and sewer hook-ups were engineered according to the high-volume requirements of a past tenant, which none of the present tenants require. Isobar, Inc. has said that one-third of the electric bill for the site is accounted for by the loss of unused power through heat transfer from the transformers.

Portions of the area are zoned for heavy industry south and north of "H" Street. The foundation consists of five acres of soft ground (in addition to the four acres underwater) but the remainder of the property (22 acres) is above flood level. No fill has been used on the site. The grade is under 5%.

There is good rail access by the Southern Pacific line which runs adjacent to the property. Truck access is also very good, as the site is close to Interstate 780 and is connected by good roads. There is a possibility of a future freeway connection in the Benicia Industrial Park which would possibly provide even better access.

\*Interview with Howard Jenkins, Isobar, Inc., February, 1976.

## Area #16 - Petaluma River/Sonoma County

Area #16 is located within the unincorporated section of Sonoma County, adjacent to the mouth of the Petaluma River. This area is entirely vacant with the exception of a small marina. Topographical characteristics would not result in any development limitations, however, further study would be required to evaluate soil suitability and the possibility of liquefaction potential due to the proximity of the Rogers Creek Fault.

Water transportation access is restricted to shallow draft vessels since channel depth is only eight feet. Land transportation is available via Highway 37 and the Northwestern Pacific Railroad. Water and sewer services are currently not available. Assembling a large parcel would not be difficult since there are only two private owners within the area.

The area is indicated as agricultural use in the proposed Sonoma County General Plan. Recreation uses related to the existing marina might also be considered in conformity with the plan. It is highly unlikely that industrial development would be permitted, based on the proposed plan.\* However, this plan has not been adopted yet and a more specific area plan for the South Sonoma Valley Areas #3 and #4 will be completed in the near future. While industrial demand for shallow draft sites is currently weak, technological changes in industrial processes or transportation and/or the exhaustion of deep water sites may result in increased demand in the future. Therefore, it would seem appropriate for BCDC to retain the existing priority use designation and simply monitor the institutional factors affecting the development of this area and coordinate planning efforts with the Sonoma County Planning Department. Sonoma County recognizes that BCDC is responsible for integrating regional concerns relating to the development of water-related industry. If it is shown that demand exists for utilizing a shallow draft site at this location, then perhaps industrial use would be considered appropriate by the county.

\*Interview with Bob Pocan, Sonoma County Planning Department, March, 1976.

## Area #82 - Hunters Point Shipyard

The shipyard encompasses 956 acres of which 522 are dry land and 433 acres are submerged. This was originally the site of Bethlehem Steel Company drydock facilities, which was purchased by the Navy in 1939. The site is divided into northern and southern areas by Hunters Point Ridge, which confines traffic between the two areas to a rather narrow corridor. Access to the site is by moderately congested urban arterials which connect with U.S. 101 and Interstate 280 Freeways. There is presently a spur track, providing rail access; if entire trains and mainline locomotives were required to serve the area, new rail facilities involving some bay filling would be necessary. There are no significant soil problems. Utility services are adequate excepting sewer service, which is currently being remedied by the Navy's construction of a sewer facility. The facilities include six drydocks and over 50 berthing spaces and are primarily oriented to the repair and remodeling of vessels. There are 397 buildings (4,373,266 square feet) providing industrial space and 57 buildings (107,870 square feet) for housing and other non-industrial uses). There is no undeveloped waterfront acreage. The natural advantage of this site is the unrestricted channel depth of 60 feet leading up to the piers and 25 to 45 foot depths in the berths. Presently some maintenance dredging is required; however, this is of infrequent necessity.

There are substantial problems associated with most potential industrial uses of part or all of this area. Some of the shop facilities are quite modern; however, many of the buildings were designed as temporary structures and may be uneconomic to operate on a long-term basis. The Navy is only



willing to lease the area as is, with the requirement that shops, drydocks and perhaps berths be maintained in operable condition. Only a five-year lease with two options to renew is being offered, which may be somewhat of a deterrent to potential industry users of the site's facilities. The final institutional problem is that the Secretary of the Navy may reclaim use of the area within 30 days of declaration of a national emergency or 90 days for any other purpose.<sup>1</sup>

Originally, the Navy intended to act as a landlord, offering any part of the facility for lease. The City of San Francisco indicated that it was interested in leasing the entire facility as the city representatives felt they could more successfully integrate use of the shipyard facilities with other port facilities and adjacent land uses; therefore, the Navy decided to offer the entire facility. The city is expected to gain control of the shipyard and has been studying use priorities for the shipyard facilities.

The city considers the shipyard as divisible into three primary areas: (1) industrial, commercial and related support facilities; (2) shoreline park and marina; and (3) ridgetop residential and related uses.<sup>2</sup> In the industrial and commercial area, the first

<sup>1</sup>Department of the Navy, Naval Sea Systems Command, Proposed Terms and Conditions for Out-leasing of Ex-Hunters Point Naval Shipyard; December, 1975.

<sup>2</sup>Sedway/Cooke and Developmental Research Associates, Hunters Point Shipyard Study, prepared for the San Francisco Department of City Planning; June, 1974.

priority will be to encourage use by shipbuilding and repair firms and their subcontractors in order to make optimal use of the deep water access and existing drydock facilities. It is expected that the smaller drydock areas will be in heavy demand by repair firms and that other facilities may be leased by barge or other heavy equipment builders and/or ship scrapers. If such firms are interested, it is expected that they would utilize the existing specialized shop facilities.

The second priority users which could utilize non-specialized industrial building and berthing space are other water-oriented industrial activities such as marine terminals. The attractiveness of shipyard facilities to this type of activity will be determined by the extent of redevelopment of existing waterfront facilities undertaken.

The third priority will be those activities which require locations near, but not directly on the water; these might be other shipping-related services such as tank cleaners. The last priority for industrial use is general industrial activities which have no water dependence. Because of the lease terms, it appears unlikely that any water-related users who would require major capital improvements to existing facilities will be attracted to this area.

Presently, the status of Hunters Point as a water-related industrial area is uncertain. Shipbuilding and repair, barge and heavy equipment constructors and shipping services would be the likely water-related industries to utilize this area. Areas not used for these purposes are likely to be used by the city for port services, marine facilities and waterfront parks.

## SUMMARY

Table I-1 identifies vacant acreage within BCDC water-related industrial priority use areas. Upstream sites along the Sacramento and San Joaquin Rivers, or other areas outside BCDC jurisdiction, have not been considered (the Sacramento Channel in particular is the site of proposed new industrial activity). Since much of the acreage within the industrial priority use areas offer only shallow draft access, are unavailable, or are unsuitable for new waterfront industrial development under current economic conditions, significantly less acreage is truly available for such development than would appear to be the case upon reading the Bay Plan. In fact, vacant or unused waterfront acreage with accessibility to deep water is found only at Hunter's Point (area #82), Davis Point (area #32), and Collinsville (area #28).

TABLE I-1  
Vacant Acreage Within BCDC Water-  
Related Industrial Priority Use Areas

<u>Priority Use Areas</u>	<u>Shallow Draft</u>	<u>Deep Draft</u>	<u>Suitable for Industrial Development</u>	<u>Suitable but Physical Fac- tors Impose Some Develop- ment Constraints</u>	<u>Not Likely to be Avail- able for Industrial Development</u>	<u>Physically Not Suitable for Development</u>	<u>Physical Features Subject to Special Study</u>	<u>Total Vacant Acreage</u>
#39: Richmond		X	80	420	0	0	0	500
#35: Hercules	X		115	700	0	0	0	815
#32: Davis Point		X	40	0	0	0	0	40
#31: Crockett		X	0	0	0	0	0	0
#30: No. Contra Costa		X	380	1,020	3,700	1,690	0	6,790
#28: Collinsville/ Montezuma Slough		X	0	0	0	0	8,560	8,560
#27: Suisun/Monte- zuma Slough	X		0	0	0	0	2,710	2,710
#26: Suisun Slough	X		0	0	0	0	930	930
#23: Benicia Industries		X	710	1,000	0	0	0	1,710
#20: Vallejo	X		9	0	0	0	0	9
#18: Mare Island		X	85	0	910	0	0	995
#16: Petaluma River/Sonoma	X		0	0	800	0	0	800
#82: Hunters Point Shipyard		X	0	0	0	0	0	0
			1,419	3,140	5,410	1,690	12,200	23,859

Source: Gruen Gruen + Associates, with technical assistance  
from P. Knepper, Cartographer, Association of Bay  
Area Governments

NOTES FOR TABLE I-1

#32 - The remaining acreage is owned by Dillingham Corporation. The development of an LPG marine terminal and tank farm is currently planned. A portion of the site may be leased or sold to another water-related industrial user.

#18 - The suitable acreage within this area is not available for water-related industry, since there is no direct access to the channel.

#16 - This area has been categorized as not likely to be available for industrial development based on the proposed Sonoma County General Plan. County policy is subject to change if demand exists for utilizing a shallow-draft site at this location.

#82 - Although there is no vacant acreage in this area, there are 397 buildings (4,373,266 square feet) available for industrial use and 57 buildings (107,870 square feet) available for housing and other non-industrial uses.



## II. WATER RELATED INDUSTRIES

### A. Finding Concerning Current Use of the Bay

The current BCDC Bay plan has designated those areas discussed in the previous chapter that are under BCDC's jurisdiction to be reserved for the exclusive use of water-related industry. The Bay Plan, adopted in 1969, defined water related industries in physical terms. The Plan's definition sets up the criterion that a water related industry requires, "frontage on navigable waters to receive raw materials and to distribute processed materials by ship" (Bay Plan, page 17).

To check the suitability of this definition and identify the industries that were dependent on the bayfront resources, we undertook a variety of interviews and analyses of existing data. Some industries with strong ties to the bayfront were readily identifiable and interviews were scheduled to ascertain the parameters of their bayfront dependency. Interviews were also held with representatives of county industrial development agencies, industrial park operators, and industrial developers to aid in the identification of other current water-related industries and those firms and industries that might have been attracted to bayfront sites for reasons other than dependency on bayfront resources. Secondary references such as Corps of Engineers reports\* were also conducted.

The finding of our research is that many of the firms now located on the bayfront do not use water transport or bay water for processing, therefore are not dependent on waterfront locations. Instead their location on the waterfront stems from

\*U.S. Army Corps of Engineers, San Francisco Bay Area In-Depth Study: Channels, Ports and Related Facilities Inventory; San Francisco, June, 1973.

either a past need for a waterfront location or a decision to locate on a bayfront site because it was cheaper to rent or buy and develop than an inland site. For example, Stauffer Chemicals in Richmond makes no use of its waterfrontage but maintains its current location because of its investment in fixed facilities and the convenient road and rail accessibility.

Our research also disclosed that some industries were dependent on the waterfront location. But there is a tremendous variation in the types and degrees of water dependency among different industries and even among different firms within a single industry. There are many different types of products produced by firms within each industry and many different technologies used to produce these products. This variety of products and processes is due partly to the fact that every firm builds its facilities with the technology that is available at the time and does not, thereafter, change that technology unless the cost of change is exceeded by the cost savings expected from that change. Varying products and changing production and maritime technologies make a quantitative analysis of the water dependency relationship impractical and, even if some type of quantitative analysis were possible, the results would quickly become obsolete due to new technological innovations.

It was clear that many of the water dependent industries were contributing significantly to the economic health of the Bay Region. The insights our research provided into the types and degrees of water dependency characteristic of existing water-related industries described in this chapter form the basis of a procedure for analyzing water dependency relationships on a case-by-case basis discussed in Chapter IV. Our research suggests that the physical definition of requiring navigable water to receive raw material should be replaced by an economic definition. An economic definition would provide a means of evaluating the water dependency of industries which is more directly linked to the functional benefit an industry gets from a waterfront location. It is more appropriate than a purely physical definition because it is tied to the factors that



permits a water dependent industry to enhance the economy of The Bay Region more than it could if it were located on an inland site. The augmentation we suggest be added to the present definition will be discussed further in Chapter IV.

#### B. List of Industries That Include Water Related Activities

Our research indicates that currently a significant number of firms from each of the following industries are dependent on bayfront locations: petroleum refining, chemical production, steel production, marine construction and repair, specialized foods processing, paper (fibers) production, energy storage and conversion, and specialized building materials.

The interviews we conducted and data we analyzed suggest that, for all practical purposes, this list is complete at this point in time; however, it should neither be used to exclude an applicant nor to confirm that an activity is water-related. Technological changes may significantly alter the dependency relationship of firms within these industries or create new dependency relationships with firms in other industries at any time. The subject of technological innovation and its effects on water dependency relationships of industries will be addressed in the following chapter.

#### C. General Characteristics of Industries' Dependency Relationships\*

##### 1. Petroleum Refining

Refineries in the region were established over a period of time and, thus, are particularly good examples of how the water dependency relationship can change over time. Early refineries

\*These discussions are based on the interviews listed in Appendix 1.

required access to coastal shipping, primarily to receive crude oil from southern California oil fields and, secondly, to ship out finished products. They also required large quantities of water for cooling purposes and the only economic sources for such quantities in those times were either bays or rivers. The draft of navigable channels was not very important because coastal tankers were typically quite small vessels.

During the intervening years, the dependency relationships have changed significantly. Most crude from the southern California fields is now transported by pipeline. Some crude is now brought in by ship from more distant sources. Because tankers all require the same number of crew members, no matter how large, very large crude carriers (VLCC's) offer substantial economies, especially over long distances. For this reason, the draft of the channel adjacent to the refinery pier has become critical for those refineries whose crude is received by ship. However, the majority of refinery shipping activity now consists of outbound movements of products (for which small tankers are still appropriate). Cooling systems technology has advanced considerably, so that the capital and operating costs of fresh water recycling cooling systems are lower than those of once-through bay or river water cooling systems when the cost of pollution controls on the latter is included; therefore, no recently constructed refineries are dependent on bay water for cooling. Yet refineries, once located and constructed, will not adopt the latest technological innovations unless the savings to be realized are greater than the cost of the change. Thus, we still find some refineries depending on bay water for cooling and others located on shallower draft sites than would be currently economically desirable.

New and existing refineries will be increasingly supplied with crude oil by ship from Alaska (and other sources perhaps) and less so by pipeline, as the California commercial fields are approaching depletion. Congress has required that all oil produced in Alaska be used in the U.S.; thus, there will be more crude available on the west coast than either the market

or the present refineries can handle. For this reason, there will be some pressure to develop additional refining capacity.

The development of this sort of additional capacity, however, is quite sensitive to crude transport costs and, therefore, will be sensitive to the draft of shipping channels adjacent to potential refinery sites. There are means of obtaining the cost advantage of VLCC's, yet obviating the need for extremely deep drafts adjacent to refinery sites. One possibility is to have the VLCC stand off in deeper water and unload its cargo into smaller ships which shuttle back and forth to the refinery pier. Another commonly proposed solution is to construct an offshore terminal (probably a monobuoy) at which the VLCC could anchor and pump its cargo to the refinery via a pipeline. San Francisco Bay is not deep enough to accommodate most VLCC's, thus the ship would have to stand outside the Golden Gate where the unpredictability of west coast weather would play havoc with shipping schedules. This effectively rules out the shuttle system here. Weather conditions would also force developers of a monobuoy to locate some distance south of the Golden Gate, adding to the pipeline cost of such a terminal. The huge capital investment involved in such a development would require that either a consortium of oil companies or a government agency undertake it. No new refinery would undertake it alone, yet little new refinery capacity is liable to locate in the San Francisco Bay Area without it. Most new west coast refining activity is now being located on Puget Sound where there is access to much more VLCC traffic. Yet the San Francisco Bay Area would be more attractive due to the larger regional market and better inland access were the problem of VLCC access overcome.

Refineries will almost always operate more efficiently if they have access to shipping and, thus, will always be water-dependent. However, their dependency is only moderately strong in

that they are not particularly sensitive to the difference in costs associated with operating within a zone of some number of miles from a point of shipping access, depending upon terrain and pipeline right-of-way costs, although there may be some dependency on closer locations to facilitate occasional receipt of very large pieces of equipment by barge. Beyond that zone, the costs of right-of-ways and pumping becomes significant; thus, it is not reasonable to expect that new refining capacity will be added much outside that zone, as long as there are sites available in other west coast waterfront areas.

## 2. Chemical Production

Present chemical producers vary somewhat in their dependency upon shipping access, but are generally dependent on bay or river water for cooling purposes. Raw materials, called feedstocks, from distant suppliers are likely to be shipped in, but in fairly small vessels so that draft is not critical. Raw materials from closer suppliers may also be shipped or barged in. Seldom are products shipped out, due to the low volumes of each product likely to be consigned to any given customer. Customers using large volumes and/or particularly dangerous chemicals are much more likely to locate relatively close to the chemical plant and receive the product by pipeline.

The ready availability of oil products, particularly naptha, is providing a major impetus for location of petrochemical plants on the west coast as Alaskan oil production approaches.\*

Petrochemical producers will be particularly attracted to the San Francisco Bay Area since refineries in California will provide the bulk of the feedstocks. California composes the major

\*U.S. Department of Commerce, Domestic and International Business Administration, U.S. Industrial Outlook, 1975.

percentage of the west coast consumer market and there are no suitable sites in southern California. A significant number of chemical users will likely be attracted to the San Francisco Bay Area by petrochemical producers, although not necessarily to sites adjacent to petrochemical plants.

Petrochemical and other chemical plants are likely to continue to be dependent on access to shipping and water for cooling. Their dependency is moderately strong; it is of a nature similar to that of petroleum refining in that they can locate some distance from the points of shipping access and water intake without incurring significantly greater costs, again depending on right-of-way and pumping costs. In addition, they will continue to be relatively insensitive to the draft of adjacent shipping channels (above 25-30 feet).

### 3. Steel Production

There are three types of steel production facilities. Basic manufacturing facilities ("fully integrated mills") produce steel in some basic form such as billets from ores and other raw materials; scrap mills produce similar basic forms such as billets from scrap steel; and finishing mills manufacture a wide variety of products from these basic forms. Facilities of two types are frequently combined on one site to minimize a variety of costs including transportation, though many examples of each type of single purpose facility exist.

The first type of facility to be established in a market area is a finishing mill, examples of which exist in the San Francisco Bay Area. Such facilities are frequently heavily dependent on shipping access to receive steel billets, although they may not ship out any products by water. In the past, many finishing mills used bay or river water for cooling and occasionally for process water; however, newer facilities do not.

If a market area is large enough, it may also be able to support one or more scrap mills, which frequently are combined with finishing mills. If the local supply of scrap is sufficiently **stable**, then the facility is not water-dependent at all; if the local scrap market is not well developed, then the scrap mill may be somewhat dependent on access to other scrap suppliers by ship. The degree of dependency generally hinges upon the frequency at which other suppliers are required, but any dependency is generally substantial because the cost of handling scrap from a pier to an inland site. The San Francisco Bay Area supports a number of scrap mills such as Judson Steel in Emeryville which are generally not strongly dependent on waterfront locations.

The largest type of facility is the fully integrated mill, which may also be combined with a scrap mill and/or a finishing mill, if located in or near a major market area. This type of facility is frequently a user of water for cooling purposes, although recent pollution control requirements have just about eliminated this dependency as alternative systems using other water sources are now just as economical. The dependency on access to shipping depends primarily on the source of raw materials and, secondly, on the market(s) served. Most fully integrated mills receive the bulk of their raw materials by ship, thus are heavily dependent on access to shipping and locations immediately adjacent to the pier. Although two notable exceptions to this rule exist, one in Utah and another in southern California, both were originally constructed by the Federal Government for security reasons; yet both receive raw materials by rail from other inland locations and are presently economically viable operations.

There were proposals to develop fully integrated mills in the San Francisco Bay Area in the 1960's and early 1970's; however, they were stalled by the combination of intense competition from foreign producers and domestic environmental controls. Foreign producers generally depend on purchasing raw materials



in world markets, unlike domestic U.S. producers who frequently own sources of raw materials; thus, foreign producers have been caught in the recent rapid inflation in world markets and are beginning to have difficulty competing with domestic producers. This is again increasing pressure on the domestic producers to expand their capacity. In recent years, as much as 40% of the west coast demand for steel has been satisfied by foreign producers, notably Japanese firms, a higher percentage than any other part of the U.S.; thus, it is likely that the pressure to expand production capacity will be most acute on the west coast. In fact, this pressure will be most acute in the San Francisco Bay Area, since there are no additional practical sites in southern California and Puget Sound is again rather distant from the bulk of the market.

One technological development that might forestall the development of a fully integrated mill is the pelletizing of steel. There remain some doubts about where the pelletizing function should be performed, due to the high energy input required, but once produced, pellets are readily substitutable for the billets produced by either a fully integrated mill or a scrap mill. The advantage of the pellet form is that it can be shipped as a bulk commodity by mixing the pellets with water and pumping the resulting slurry in and out of ships. If pellets can be produced and delivered cheaply enough, then the development of additional finishing mills will be encouraged and a fully integrated mill will be unable to compete and, therefore, be unnecessary. Finishing mills depending on the delivery of pellets by ship would be water-dependent, although perhaps not as heavily dependent as a fully integrated mill or even a mill receiving moderate volumes of scrap by water, since the pellet slurry could probably be piped a short distance inland without incurring significantly greater costs.

#### 4. Marine Construction and Repair

Essentially two types of activities fit into this classification: the construction and repair of fixed waterfront structures such as bridges, marinas, breakwaters, etc., and the

construction and repair of waterborne equipment such as ships, barges and heavy equipment that cannot be transported otherwise. Most firms in this class are heavily dependent on bayfront locations for obvious reasons. The firms that work on fixed structures tend to require large sites for storage of their floating equipment and for assembling raw materials; however, they are usually only dependent on shallow draft access, as opposed to ship construction and repair facilities, which require deep draft sites. At present, those facilities specializing in fabrication of large structures to be moved by barge require channel depths of approximately 20 feet.

## 5. Food Processing

Firms in this class are generally involved in receiving shiploads of agricultural products which they then process and distribute by rail and truck for commercial or direct consumer use. Firms may occasionally be involved in exporting their products by ship as well. These activities are attracted to the San Francisco Bay Area because of particular transport advantages that exist here (e.g., the availability of inexpensive truck transport because trade flows in the opposite direction). Food processors are not particularly sensitive to the draft of channels, as the volumes of trade being handled are not conducive to the development of large, dry-bulk carriers. However, the firms are fairly sensitive to proximity to the pier as ships are usually unloaded by crane or vacuum onto a conveyor system, extensions of which are costly.

## 6. Paper (Fibers) Production

Paper producers are attracted to the San Francisco Bay Area because of the regional market for their products. They are characterized by small numbers of large operations and considerable product line specialization.\* Because of this specialization, dependency on bayfront locations varies from one operation to another and it seems to have varied from time to time; however, all are heavily dependent on water for cooling and process needs. Where the need for shipping access exists, it is for the purpose of receiving raw materials, seldom for shipment of products; it is generally relatively low volume, thus not overly sensitive to channel draft. The factor that appears to have accounted for the most variation in dependency on shipping is the growing use of recycled fibers. This trend is expected to continue, although it cannot completely supplant the need for receiving new fibers by ship; however, the dependence may be so minor that it may be satisfactorily accommodated at multiple-use port facilities some distance from the industrial plant. The need for large volumes of cooling and process water will persist.

## 7. Energy Storage and Conversion

The storage type of activity will generally be dependent on shipping access for receipt and occasional delivery of fuel and is likely to be extremely sensitive to the draft of the adjacent shipping channel and somewhat inflexible as to the distance the facility may be removed from the receiving pier. The conversion-type facility may or may not be dependent upon access to shipping, according to the location of the fuel supplier, but is quite likely to be dependent upon the use of water for cooling. The activities dependent upon shipping are likely to be moderately dependent on being located in close proximity to the receiving pier.

\*U. S. Dept. of Commerce, Domestic and International Business Administration, U. S. Industrial Outlook, 1975.

## 8. Specialized Building Materials

Certain building materials manufacturers and distributors are dependent on access to shipping for receipt of raw materials either from distant sources or from waterfront or underwater deposits. In some cases, the products are also distributed by water. In most cases, there is no dependence on water for cooling or processing. Many of these activities are dependent only on shallow draft transport access and even those requiring access to deeper draft vessels are not very sensitive to channel draft.

## 9. The Interrelationship of Ports and Water-Dependent Industries

The dividing line between port activities and water-dependent industrial activity is rather ill-defined. The need for separate industrial shipping facilities seems to be dictated by interaction of geography, port authority action (or inaction) and economic relationships. In scrap metal export activities, for example, the scrap dealers are undoubtedly water-dependent, yet most are located in older port areas because they require only the most basic waterfront facilities and are relatively cost-sensitive. This study is somewhat constrained in that it has not considered the appropriateness of land not now included in water-related industrial priority use areas, such as port priority use areas, and the regulation of their use to assure continuing economic benefits to the region. Consistency in approaches to these activities is of the utmost importance due to this intermixture of port and water-dependent industrial activities and the importance of all these activities to the regional economy.\*

\*GG+A, An Analysis of the Relationship Between the Port of San Francisco and the Economy of the City and Bay Region, a report to the Economic Subcommittee of the San Francisco Mayor's Port Committee, June 21, 1972.

GG+A, Recommended Scope of the Regional Seaport Plan, a report to the Regional Seaport Policy Committee of the Metropolitan Transportation Commission, July 1975.

### III. AN ASSESSMENT OF THE EFFECTS OF TECHNOLOGICAL CHANGES ON WATER-DEPENDENT INDUSTRIAL ACTIVITIES\*

#### A. Introduction

Chapter II discussed the variety and complexity of industrial water dependency relationships. To some extent, it also dealt with the impacts of previous and some potential technological changes within existing water-dependent industrial firms. The viability of current and potential water-dependent activities is affected by the state of shipping technology, available resources and industrial technologies. All three aspects are addressed here and their impacts, particularly on the viability of shallow draft industrial activities, examined. The conclusion that flows from these analyses is that, because of the inherent economies of waterborne transportation, industrial access to the bayfront will continue to be an important source of industrial strength and consumer benefits for the San Francisco Bay Area.

#### B. Maritime Technology

The maritime development that has received the most attention in recent years has been the growing size of some types of bulk carriers, especially crude oil carriers. This trend

\*This section is based on interviews listed in Appendix 1 and the bibliography of sources presented in Appendix 2.

has occurred because of the increasing numbers and density of long distance crude oil transport routes. Bulk carriers tend to require about the same size crew, no matter what the tonnage of the ship; thus, there are obvious economies of scale if the volume of a particular trade can justify constant use of such large vessels. The longer the trade route, the less volume per period of time is required to keep such a vessel occupied; however, more storage capacity is required at both ends of the ship's voyage. Because of the large investment involved in such vessels, it is also not likely that the economics of the offering of such vessels for single-trip charters will recommend itself to either shipowners or potential users; thus, the development of these "super ships" is likely to remain confined to high volume, long distance service dedicated to the carriage of a single commodity. What this means in relation to water-dependent industries is that the impact of this particular technological development will probably be felt strongly only by the petroleum industry, although at the same time, it is making the development of new alternative sources of energy viable. This subject will be dealt with more fully a bit further on in this section.

The second maritime technological change that may impact industries is the development of lighter-aboard-ship (LASH) vessels. LASH vessels have the ability to load and unload entire specially constructed barges (called lighters) in open water. This system significantly reduces the overall costs normally associated with traffic originating at or destined for shallow draft sites, since such traffic heretofore had to be brought to a deep water port for transshipment between normal break-bulk cargo ships and shallow draft barges. The LASH technology has proven to be quite a boon to regions where the only transport options available are



shallow draft water transport (usually on a river) and/or land-based transport systems (usually railways), both of which may offer access to a fairly distant deep water terminal. In this type of situation, LASH technology had had the effect of significantly extending the benefits of ocean shipping's inherent economy further inland, making water-dependent industrial development economically viable further inland.

Despite the substantial reduction in waterborne transport costs LASH service has made available at shallow draft sites, water-dependent firms have not found it economically desirable to locate on shallow draft sites in the San Francisco Bay Area. There are many reasons for this. For one, there have been adequate deep draft sites to accommodate most heavily shipping-dependent industrial activities. The majority of shallow draft sites are in relatively remote locations also, so that an industrial firm dependent on shipping for small or moderate volumes of cargo may find it more economical to locate at a more central inland site which requires a short overland movement to a pier or port facility (and more efficient regional overland collection and distribution) compared to a relatively long water movement of a LASH (or other type) barge. Even if a shortage of deep draft sites develops, it is not clear how much of the demand for deep draft sites would be diverted to shallow draft sites as owners of already developed deep draft sites may then be induced to redevelop their sites to accommodate denser land use.

Other than the development of LASH service, there have been no significant maritime technological innovations that appear likely to affect demand for shallow draft sites. Intraregional barge traffic on San Francisco Bay is fairly light because of a

combination of the following factors: distances are relatively great; most waterfront sites have good access to land-based transport systems; circuitry of land versus water transport is not substantial; and barge operation is relatively labor-intensive.

### C. Resource Scarcity and Industrial Technology

The increasing scarcity of many natural resources and their concomitant increase in value has made the idea of recovering resources from solid wastes quite popular. To be economically viable, such an activity must operate at a fairly high volume, necessitating collection from a geographically large area. Because of the low time-value of the material and large volumes, it is likely that shallow draft barge transport will be most appropriate. Some demand for shallow draft sites for such activities may be expected in the future.

At the same time, the increasing cost, partly due to scarcity, of petroleum is resulting in much more exploration for off-shore deposits and exploration in increasingly deeper waters. This is resulting in considerable expansion of the firms which construct the platforms and other large steel structures for a variety of purposes. The greater depths involved is resulting in a need for larger platform structures. These structures are floated to their destinations, of course; therefore, while 20 foot draft sites have been sufficient for such construction activities previously, planned structures may soon require up to 50-foot drafts. This construction activity is expected to be moving away from shallow draft sites.

The simultaneously increasing scarcity of other energy resources is encouraging the development of alternative sources of energy capable of being readily substituted for commonly used domestic sources of energy. The most often mentioned, most abundant domestic fuel resource, yet currently little used, is coal. There have been a number of technologies developed or perfected in recent years to mitigate the serious environmental problems associated with burning coal in its natural state. In addition, there have been a few more exotic technological processes developed to transform coal into forms more readily substitutable for commonly used fuels, such as natural gas (coal gasification), crude oil (methane) and even gasoline (methanol).

Probably the most critical factor affecting any further development of all of these technologies is, simply, whether enough coal can be produced to allow their development. New safety requirements and wage agreements have greatly increased the cost of mining coal in recent years. Many of the eastern U.S. mines are producing coal whose sulphur content is quite high, yet it is unclear what levels will be allowed under the new environmental controls; at the same time, the vast deposits of western coal, which have low sulphur contents for the most part, can only be economically produced by strip-mining techniques, which are also under environmental attack. It is fairly safe to assume that any coal-powered, electric generating stations or coal conversion plants established in the San Francisco Bay Area will be supplied by western coal producers and quite possibly the coal will be transported by rail, since most of these deposits are at inland sites; therefore, plants depending on these sources will probably not be dependent on shipping access. They quite possibly will heavily

be dependent on bay or river water for cooling purposes; however, this sort of activity might be able to operate on a shallow draft site or at an inland site provided with access to the bay or river for cooling water intake and discharge.

There are two other available technologies which both produce substitutes for domestic natural gas. Liquified petroleum gas (LPG) would be produced wherever petroleum is plentiful, which means either Alaska or the Middle East. LPG can be transported by fairly normal tankers at only slightly sub-normal temperatures and would be brought to a storage center, from which it could be distributed by truck or rail to industrial and other users to augment normal natural gas supplies. Liquified natural gas (LNG) can be produced wherever there is an abundance of natural gas, probably the Middle East or possibly Venezuela, but must be shipped in special cryogenic tankers. The storage facilities must also be refrigerated. To be distributed, LNG must be regasified and pumped into pipeline systems. In both the LPG and LNG systems, the storage facilities must be within fairly short distances of the receiving pier; thus, both would be quite dependent on bayfront locations. LPG terminal operators would be moderately to highly sensitive to channel draft because the volumes to be handled would justify moderate to large size ships. LNG terminal operators would be highly sensitive to channel draft as increasing the size of LNG tankers produces not only labor economies, but also refrigeration economies.

There is currently a proposal to develop an LPG terminal in the San Francisco Bay Area. At the present time, the regional market would not justify the higher capital investment required for an LNG terminal and distribution system. Growth of this type of activity depends most heavily on the future domestic regulatory policies towards natural gas. It is possible that the regional market will eventually attract more LPG suppliers or perhaps an LNG supplier.

Finally, the scarcity of metallic ores has recently spurred development of recovery and processing technologies for mining metallic minerals known to exist on the floors of the world's oceans. It is now estimated that about one-half percent of the ocean floors could be mined under current economic conditions to produce immense amounts of copper, nickel, cobalt and manganese. Taking copper as an example, 250 million tons could be produced under current economic conditions, whereas previously known economically recoverable world resources were estimated at only 300 million tons.\* The heaviest deposits of these minerals are located in the Pacific and would most efficiently be shipped from point of recovery to processing plants either in Hawaii or California.

\*Swan, D.A. "The Potential of Manganese Nodules as a Future Mineral Resource", Marine Technology, January 1974, pp. 31-33.

This industrial activity would also be dependent on deep draft sites. The only significant impediment to the exploitation of these resources is the rather nebulous status of international jurisdiction. The question of legal rights must be cleared up as there would otherwise be too much risk associated with the very large capital investments required to initiate this industrial activity.

#### D. Conclusions

Despite our ability to describe and analyze these technological trends, there will always be some developments that could not be foreseen. The inherent advantages of water transportation will always remain; therefore, there will always be industrial activities that can economically benefit from gaining access to this form of transportation. Salt water will likewise always be more plentiful than fresh; thus, for some industrial activities, the use of salt water for appropriate uses will continue to produce economic benefits. For these reasons, it is important to realize that access to bayfront resources will continue to be an extremely important source of industrial strength and consumer benefits. It is therefore important for BCDC to undertake reasonable actions to preserve access to bayfront locational resources. The allocation of access to resources based on an economic augmentation to the present definition will be less arbitrary than allocation based on the present definition alone. Furthermore an economic definition ties in with the regional benefits bestowed by water related industries so that, at a later time, the definition can be used to evaluate possible trade-offs between the economic benefits of utilizing a site for its industrial versus its environmental benefits.



#### IV. CRITERIA FOR THE USE OF INDUSTRIAL PRIORITY AREAS

##### A. The Danger and Regional Costs of Running Out of Deep Draft Sites

The research summarized in the first three chapters of this report indicates that industrial sites with deep draft access are already relatively scarce. Furthermore, foreseeable trends in technology and energy availability suggest that the demand for deep draft industrial sites will increase in the next decade. It is even possible that some shallow draft sites will be demanded by barge using industries, industries that utilize water for processing and firms requiring only pipeline access to the waterfront.

If the site demands of the industries whose activities are truly water related cannot be met, the region will lose some major benefits. The economy of the region and its consumers would suffer from one or more likely combinations of the following results of not being able to provide sites for water-related industries:

1. The region would lose jobs and income-producing opportunities as water-related industries and those other industries that depend upon their products as inputs would not locate in the region;
2. The region's consumers would pay more for products as the increased costs of locating water-related firms inland are passed on to them;
3. The quality of some goods provided to the region's consumers or industries will suffer as firms trade off quality to make up for the cost disadvantages of inland sites.

##### B. Recommendations to the Commission Concerning Industrial Use Areas

The existing BCDC Bay Plan recognizes the danger of running out of industrial waterfront sites that do not require fill. It has

attempted to lessen this danger by designating priority use areas around the bay for the exclusive use of "water-related industries". Our analysis of the information summarized in the first three chapters of this report leads us to make the following recommendations to the Bay Conservation and Development Commission:

1. Deep-draft areas presently designated as industrial priority areas should be maintained as such.
2. These areas should be reserved for use by water-related industries or appropriate interim users (see Chapter VII) as indicated in the present plan.
3. The present physical definition of water-related industries should be augmented with an economic definition to make it more responsive to the need for an approach that will identify those industries whose use of the bayfront would benefit the region from those that would not.
4. Even though shallow-draft sites are not as scarce as deep-draft sites, they should also continue to be reserved for water-related industrial use except where critical environmental values are identified. Future technological changes may increase the demand for such sites. Furthermore, once the roads and utilities to nearby deep draft sites are put in, the demand for shallow draft sites for non-water-related uses will expand. If such users are excluded, water-related industries that do not need deep-draft sites will tend to utilize cheaper shallow-draft sites and thereby lessen the demand for deep-draft sites.

#### C. An Economic Definition of Water-Related Industries

As mentioned previously, in the Bay Plan, water-related industry is defined as those industries requiring "frontage on navigable waters to receive raw materials and to distribute processed materials by ship" (Bay Plan, p. 17).

This physical definition does not fully reflect the basic economic factors that determine whether an industrial activity is water-related. As the definition stands now, an activity or

firm that uses bay water and produces great regional benefits but does not ship from the plant site could be denied a permit; whereas another firm that occasionally ships out a product could be granted a permit. In most cases, cost is the factor that causes an activity or firm to be water-related. A water-related firm is dependent on the shoreline because something makes it cheaper for the firm to operate next to the water than inland. The only type of costs that should not be considered when evaluating whether or not a firm is water-related because it can operate more cheaply next to the bay than from an inland location are those costs related to land price or rents. We will explain in the next section of this report why rents or land price costs should not be considered.

In rare cases, an industrial activity or firm may also be water dependent because of a revenue related factor. That is, some activities may be able to charge more to customers because of their shoreline location. One example of such a situation would be ship repairing facilities. The ship owner who wants the repairs done must bring his vessel to the ship repairing activity or firm. Thus, the ship owner prefers a shoreline location that will enable him to float his vessel to the repair facility. Because of this obvious situation the ship owner will pay more for repairs at a waterfront facility than he would pay to an inland facility that required him to take his vessel out of the water in order to get it to the repair yard. From the viewpoint of the repair firm, they can charge more from a waterfront facility than from an inland site. In the jargon of the economic literature, the ability to charge more for the same product at one location than the other is termed location related "revenue differentiation".

A definition of water-relatedness that reflects the two basic factors discussed above would also permit future consideration of the value of the regional economic benefits associated with a proposed bayfront industrial land use in comparison to the

environmental value to the region of the site proposed for such use. This is true because these basic economic factors can be used to judge the nature or extent of the economic benefit produced by the water-related industry. This concept is discussed further in Chapter VI.

In the light of the basic relationship that must exist between any water-related activity or firm and the shoreline location, we suggest that the present physical definition be revised. We suggest that the language of the definition be revised to include the following definition: *To be water-related, an activity or firm must gain cost savings or revenue-differentiating advantages, neither of which is associated with land rents or costs, from being located on the bay shore that it could not obtain at an inland location.*

We recognize that the definition is couched in the language of the economic profession. But in the case of a definition such language does add precision. The definition subjects each activity to a single test. The test permits BCDC to determine whether or not an industry would produce less benefit to the region if it were excluded from the bayfront. One aspect of the test is to see whether or not an activity's non-rent related costs would be larger if it operated at an inland site. This production cost is straight-forward and, fortunately, our analysis suggests that the waterfront versus inland cost differential for most water-related industries is relatively large and therefore not difficult to substantiate. If a customer would pay less for the industry's services inland, then the industry is water-related because it has passed the economically-related revenue differentiating aspect of the test. Such situations will be much rarer than the existence of a cost differential between inland and bayfront sites.

D. The Reason for Excluding Land Rents and Prices From the Economic Definition of Water-Relatedness

The importance of excluding land prices and rents from the test of water-relatedness may not be obvious. But to consider such factors in the decision-making process would introduce the very factors that keep the market from operating in an economically and socially desirable manner when it comes to the allocation of waterfront sites.

In the textbook description of a market operating under conditions of pure and perfect competition, all resources are allocated on a socially optimal basis. Such allocations result because the market acts as a feedback system in which producers and consumers communicate with each other through price signals they effect and are affected by. When the resource being allocated is in fixed supply (such as in the case with bayfront land if we do not allow extensive additional filling), then the price signal is referred to as "rent". Rent, or the capitalized version of rent that is expressed as land price, is the market's rationer of land. In a perfectly functioning, purely competitive market situation, there would be no difference between social opportunity costs and opportunity costs to the firm based on the ability of various firms to bid on bayfront site land rents.

Such a happy result would occur as equally competitive users bid against each other until all those users who could operate more economically elsewhere were priced out of the bidding process, leaving only those who must stay in the bidding because to go elsewhere would saddle them with still higher costs than the current bid price (the costs of going elsewhere are the opportunity costs of the firms). If the firms in the bidding situation were all operating in competitive markets, then ability to bid would be affected by only two forces: consumer demand and the relative price of all resources. The firms that can get the greatest relative increases in demand and the greatest relative decreases in costs by locating on the

bay rather than elsewhere would have the highest opportunity costs and would be the highest rent payers. Thus, the firms who would be priced out of such sites would be those that produce products that customers will not pay more for because they are produced at waterfront sites and that can be produced elsewhere with relatively little higher cost differentials. Society's opportunity costs - what it gives up because some activities do not locate on the bay - would be minimized. Society's gain - what it gets because some activities locate on the bay rather than elsewhere - is maximized.

The result described above expresses in economic terms what BCDC is attempting to achieve through its system of priority use areas. The market will not achieve this result because of three types of differences between the active market and the structure of pure and perfect competition described in textbooks. The nature of these imperfections and inequities is summarized below.

1. The attitudes toward time of society as a whole and its individual members differ radically. Once a site is developed, the reuse of that site is often so expensive that, except for massive shifts in the opportunity costs of other uses, the use is irreversible. Because individuals are more concerned with the short-term earnings than the long-term earnings, the market allocates resources according to current conditions rather than holding available land for future options. Once developed, the sites tend to be immobile, so that more significant water-related uses that turn up later in time cannot bid for them on an even basis.
2. Shifting technology and consumer preferences create new water-related industries while lessening the degree of water-relatedness of other industries. The fact that developed waterfront uses are not easily reversible creates an immobility that fails to respond to shifting technology and consumer preferences.

3. Some of the bidders in the market are not competing for customers in an environment of pure competition. Firms with some price-setting power (monopolistic competition, oligopoly, monopoly) or under government regulations can frequently absorb the price of bidding higher than the cost to them that alternative sites would warrant.

These differences between the actual market and the textbook's simplified description of the world produce rents and land values that do not optimize social benefits. Therefore, land rents and prices must be excluded when planning decisions are made. To do otherwise would be to introduce into the planning decision the very market factors that required planning intervention in the public interest.

#### E. Data Required to Determine Water-Relatedness

As mentioned previously, application of an economic test for water-relatedness should not be a complex statistical procedure, as industries should be able to demonstrate their water-relatedness easily or not at all.

The test to be applied is whether or not the activity gains any non-rent or land price-related cost or revenue-differentiating advantages from operating at the proposed bayfront versus an inland site. A cost differential may stem from the need to substitute a more costly input at an alternative site for a cheaper one available on the bayfront. For example, the extra costs of laying a pipeline from a pier to an inland refinery represent a cost of not locating the refinery on the bay. Cost differentials will be internal to the firm, as is the refinery example just cited. A revenue differential stems from a factor external to the firm, but affects its ability to compete within its industry.



Revenue differentials will not be as commonly encountered among industries as they would be if commercial or residential use of bayfront sites were being considered because of the amenity value of bayfront locations to commercial and residential land uses.

The data requirements of this procedure are not extremely exacting, nor should they impose an unreasonable burden on the applicant. We recognize, of course, that some firms may be irritated by the need to demonstrate that their activity is water-related. But, we feel the economy of the Bay Region is strong enough to suffer the loss of industries whose tolerance for public requests are so low that they will try to alter regions rather than provide the needed demonstration. We feel the loss of such firms would be more than offset by the gains of preserving our deep water sites for the industries that need them.

Whenever relevant industry-wide estimates of costs exist, they may be used. When the data is presented, as wide a variety of operating alternatives as possible should be considered. Alternative raw materials sources, transport and handling systems, alternative production technologies, and alternative product markets, handling and distribution systems should be investigated. Each alternative will have particular characteristics that render it economically feasible only under certain conditions; full understanding of these characteristics must be gained. Finally, care must be taken that only costs solely associated with operations at an alternative site are considered and that only the additional costs of operating at an alternative site are considered.

In the course of this process, it may be found that some parts of an applicant's proposed operations are quite water-related while others are less related. This might occur in the case of

a petroleum-refining operation which is quite dependent on access to the bayfront for its pier facilities, but much less so for the refinery, which can be connected to the pier by pipeline. While there might be some question as to jurisdiction, it does not seem unreasonable to expect that BCDC could, as a result of such a finding, require location of the refinery operation some distance inland as a condition of approving a permit for use of a bayfront site for pier facilities and pipeline right-of-way. Doing so would have the effect of expanding the capacity of the few remaining vacant, deep water sites to accommodate new industrial activities requiring deep water access.

A number of different factors may be relevant to the determination of water-relatedness in any given case and different factors may be relevant from case to case. The following are a set of areas, some or all of which should be explored, depending upon the circumstances of the case:

1. Why does the applicant desire to use a bayfront site:
  - a. Deep or shallow draft shipping is desired?
  - b. Bay water for cooling or processing use is desired?
  - c. Some other bayfront resource is desired?
  - d. The land is less expensive or offers better access to rail or road transport than other comparable sites?

If 1(d) is indicated, the activity may not be water-related.

If 1(a) is indicated, consider the following:

2. Which raw materials would be received and which products would be shipped from the site?
3. What additional costs would be associated with increasing the distance between the waterfront and the firm's facilities other than pier facilities? (Some facilities may be found to be water-related while others are not and could be located at some distance from the bayfront.)

4. What other materials-handling technologies are available and how would the answer to the previous question differ were an alternative technology substituted for the proposed technology as distance is increased? (It may be found that some facilities are less strongly dependent on bayfront sites if applicable alternative industrial technologies are considered.)
5. What additional costs would be associated with operating at an inland location and using other public or private port facilities to ship or receive materials? (If there are no additional costs, then the proposed activities may not be water-related.)
6. If operation at an inland site is infeasible, what would be the additional annual cost of operation at a water-front site in an alternative region? This may be expressed in terms of price reductions necessary to generate an equivalent volume of business or other applicable measure. (If there are neither additional costs associated with operation at an inland site or a site in another region, then the activity would not be water-related.)
7. What is the draft of the vessels to be used and what additional costs would be associated with using shallower draft vessels? (If a permit for use of a deep draft site is being considered, but it is found that the applicant does not incur any greater cost at a shallow draft site, BCDC should consider requiring the applicant to use such a site.)

If 1(b) is indicated, consider the following:

8. How is bay water to be used and in what volume? (If the applicant is requesting use of a deep water site, but an adequate volume of water could be obtained at a shallow draft site, BCDC should consider requiring the applicant to use such a site.)
9. What additional costs would be associated with increasing the distance between the bayfront and the facility requiring bay water? (Some facilities may be able to locate at some distance from the bay, requiring only pipeline access and thereby preserving bayfront sites for more strongly water-related industrial activities.)
10. What additional costs would be associated with operating at an inland site without the use of bay water? (If there are no additional costs associated with inland operation over the life of the proposed facilities, then the activity would not be water-related.)

If 1(c) is indicated, consider the following:

11. What is the nature of the resource and how is to be to utilized?
12. What additional costs would be associated with obtaining this resource or a substitute resource at an inland site or location in another region? (If there are no additional costs, then the activity is not water-related.)

In summary, an industrial activity is water-related if it gains some cost-savings or revenue advantage from use of a bayfront site that it could not obtain at an inland site.



## V. POTENTIAL NEGATIVE ENVIRONMENTAL IMPACTS OF WATER-RELATED INDUSTRIES

### A. Introduction

In addition to the economic opportunity costs and benefits discussed in previous chapters of this report, there are environmental opportunity costs and benefits associated with any type of development. The costs are commonly referred to as negative impacts. The purpose of this chapter is to highlight and categorize the types of negative environmental impacts which could occur from industrial development. The general impacts identified in this discussion can be correlated with a particular industrial firm and the characteristics of a particular site. Environmental impact reports legally required to be completed for specific development proposals on specific sites would provide the details for actual anticipated impacts.

Any discussion of the potential impacts of water-related industries on the bay environment must be general rather than specific to be of lasting value. There are several reasons for this requirement:

1. A wide variety of types of industries may be determined to be water-related. These various industries use the water in different ways; therefore, their interactions with it and impacts upon it are different. An industry which relies on the bay for receipt of materials, for instance, has a much different environmental effect from one which uses bay water for cooling in its production process.

2. Even within the same industry, there are various processes and methods which may be used to produce the same output. For example, cane sugar refineries surveyed by the U.S. Environmental Protection Agency varied in the amount of water they used from 2,520 to 15,400 gallons per ton of raw melted.\* Thus, within-industry differences in interaction with the bay could be as great as between-industry differences.
3. Changes in technology which either increase or decrease the water-relatedness of an existing industry or create new water-related industries will affect the nature and degree of impacts on the environment. To conduct a detailed and quantified analysis of potential impacts, then, would require the use of a large number of assumptions about probable industries and technologies which could well be unfounded or quickly outmoded.

The potential adverse environmental effects which industries may have on the bay environment may generally be divided into two categories: water-related impacts which are integrally related to a location near the water - that is, they would not occur were a particular industry sited inland - and are usually limited to impacts which involve water use and quality; and non-water-related impacts, which would probably occur regardless of where the industry were situated and encompass such problems as air pollution, noise, odors, and other effects.

\*Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Cane Sugar Refining Segment of the Sugar Processing Point Source Category; (December, 1973).



## B. Water-Related Impacts

A water-related industrial use, by definition, uses the water and, therefore, affects the water in some way. The most readily apparent ways are: (1) use for transportation by ship, barge, pipeline, or some combination of those; (2) temporary or permanent use of the water itself as an integral factor in the production process; and (3) use of the water as a substitute for land as a site for industrial operations. Impacts may also derive from constructing bayfilled areas to augment existing industrial sites.

### 1. Impacts from Use for Transportation

The bay will be affected in several ways by its use to transport raw materials and finished products. Impacts may be divided into two classes: Those which will result from ship and barge transport, and those caused by pipeline transport.

Required use of ship and barge transport on the bay by new industries will cause added use of waterways, routes and channels. Given the current downward trend of ship traffic on the bay, though, it is not inevitable that this new traffic will cause congestion on the bay.\*

\*Telephone conversation with Mr. Len Silva at the Marine Exchange, February 20, 1976. Mr. Silva estimated that the number of bay entrances plus departures of ships had decreased from about 10,500 five or six years ago to about 7,000 now; he attributed that decline to use of larger ships and said he expects the trend to continue. He also said that no one keeps records on barge traffic.

Congestion seems most likely to occur at docking and loading facilities or in turning basins and channels in the immediate vicinity of such facilities. While the U.S. Army Corps of Engineers has done studies which indicate that aggregate practical capacity for all ports in the Bay Area in 1980 will exceed their projections for demand of that capacity\*, many of these facilities are poorly located or obsolete; thus, traffic will be concentrated at modernized facilities plus any new facilities that might be constructed. If any new construction does occur, it could disrupt and possibly permanently displace water and bottom life which exists at its location.

\*San Francisco Bay In-Depth Study, Port Facilities Capability Analysis and Waterborne Commerce Projections and Commodity Flow Analysis for the San Francisco Bay Region.

An additional water transportation impact is the presence of water pollution (e.g., from release of operational wastes) that results from ship use at levels above what it would be absent that traffic. Newer ships may, however, have more pollution control features than do older ones. If the ships used by new industries have some of these features, then the non-accidental polluting impacts will be smaller than would otherwise be expected.

Impacts from the use of pipeline transport are generally different from those associated with ship transport. Construction of a pipeline will disrupt marine and shoreline ecosystems, increase turbidity by disturbing the bottom of the bay, and possibly interrupt ship and barge traffic. Such impacts would all be temporary. Continuing impacts would occur if the pipeline has a significantly different temperature from the surrounding water and, in that or other ways, causes permanent dislocation of bottom life. Finally, there is a possibility of accidental pipeline rupture, with the associated impacts of its released contents on the life and water quality of the bay, as outlined below.

The most significant and wide-ranging environmental impacts of water transportation activity would be those that resulted from an accident such as collision or pipeline break. While the probable impacts of such an occurrence are widely discussed and disputed, the potential impacts include (1) physical and biochemical tainting of and irreparable damage to existing water and bird life; (2) effects (e.g., smaller population, inhibited growth) of at least the first generation of offspring of the existing water left (effects on subsequent generations are as yet unknown); (3) damage to tidal marshes and other similar areas, depending on the water level in the bay during and after an accidental occurrence; and (4) contributions to air pollution if the spilled or leaked substance is volatile.

Other important impacts are likely to result from dredging the bay bottom either for shipping channels or for pipeline burial. Dredging would cause an increase in turbidity and could displace or destroy some marine ecosystems and habitats, depending on their adaptabilities, sensitivities and resiliencies.

## 2. Impacts from Use in Production

Water is used as part of production processes in several ways. Principal uses are cooling, especially in such processes as refining, and as a receiver for waste streams including high temperatures generated during production. While potentials for negative impacts on the bay are great, the actual impacts will probably be minimal or negligible because of the water quality standards maintained and enforced by the California Regional Water Quality Control Board (WQCB).\*

Impacts that deal not with pollutants per se, but that could be harmful nevertheless, are changes in turbidity, salinity, and temperature change. Salinity may be affected by, among other things, (1) the amount and precise source of water removed from the bay and contributing rivers, and (2) the amount and character of water discharged into the bay. Turbidity relates to the ability of light to disperse in the water and can be affected by (1) disturbance of bottom sediments, and (2) discharge of particulates into the water. Both conditions have implications for the survival of marine ecosystems. Temperature changes, effected by thermal discharges, may drive some wildlife, especially waterlife, from its habitat and thereby

\*Mr. Griff Johnston, Chief, Planning Division, California Regional Water Quality Control Board, stressed that this statement holds true only for known adverse impacts.

affect not only that species but also those dependent upon it in the food chain.

### 3. Impacts from Use as a Site for Industrial Operations

The water is a logical construction site for both watergoing vessels and stationary structures, such as oil-drilling platforms designed to be situated in the water. The impact of this type of use may take several forms. First, there is likely to be disturbance and some displacement of marine and bird life, including bottom life, by a construction project. Second, informal or accidental disposal of both industrial and non-industrial waste into the water may occur. For example, when naval ships are sandblasted in drydock, dust of their toxic "antifouling" paints flies into the air and settles into the water. Third, construction projects may effect changes in water temperature and turbidity in the vicinity.

### 4. Impacts of Bay Fill

Although bay filling is not a necessary impact of water-related industrial development, it is sometimes considered desirable and will therefore be briefly discussed here. Constructing bayfill can have any or all of the following effects: (1) destruction of marine habitats by removing the space in which they exist or altering the characteristics of remaining areas; (2) alteration of land-water geography and topography; and (3) increase of turbidity levels in the water. Further, depending on construction methods, bayfill provides a questionable foundation in the event of a seismic occurrence.

### C. Non-Water-Related Impacts

Water-related industries, as noted before will have additional impacts which would occur no matter where those industries are located. One potential such impact is air pollution. In the

oil industry, for example, air pollution is an ongoing problem because petroleum products are volatile that much of it will vaporize on contact with air. The U.S. Environmental Protection Agency describes storage tanks for petroleum liquids as well as petroleum refineries as sources of air pollution.

For all industries, potential sources of polluting emissions are: (1) product or material transfer points; (2) heat escape points; (3) pressure release points; (4) exhaust outlets; and (5) other processing or storage outlets. Pollutants, heat and other emissions that do occur, may affect the climate of the immediate area as well as bird habitats in the vicinity.

Another impact of some industries is potential threat to public safety. It is this threat, which stems from the extreme volatility of the resources involved, which has made industrial development such as petrochemical and liquified natural gas (LNG) plants so controversial.

Further impacts of industrial establishments include generation of noise and odors. Both of these conditions may disturb animal, bird and human populations in the area of the establishment. While humans may adapt to the presence of odors and cease to notice them, they may also be permanently affected by hearing loss as a result of continued exposure to loud noises.\*

The visual change effected by the construction of an industrial plant is another impact. While satisfactory measures for quantifying visual impacts have not been developed, it must be noted that this type of impact will occur.

\*Noise and You, distributed by the U.S. Environmental Protection Agency.

On-site impacts necessarily associated with industrial development would include: (1) alterations to topography and possibly to the shoreline; (2) alterations to, or elimination of, existing vegetation and wildlife habitat; (3) preemption of shore and close-to-shore recreation and of public access to such recreational sites; and (4) absorption of land.

#### D. Current Regulation of Impacts

There are two primary ways in which industrial development is currently regulated. One is the environmental impact review process mentioned in the introduction to this chapter. The other is the subjectability of proposed development to review and permit by a series of federal, state and local jurisdictions. The former method forms an important tool for BCDC in its planning and permit functions as a means to comprehensively assess the impacts of a development, while the latter allows the various other involved agencies to safeguard their particular areas of concern.

The environmental impact review process derives from two legal sources: the National Environmental Protection Act, which requires an environmental impact statement (EIS) to be filed for projects in which federal funding or regulatory actions are involved, and the California Environmental Quality Act, which requires an environmental impact report (EIR) to be filed for state and local planning, regulatory and funding actions which may have a significant impact on the environment. The state statute is the more encompassing of the two, because it not only includes more projects as subject to impact review, but also specifies more issues to which those projects must be related. Further, the law has been interpreted to require that findings of impacts be evaluated and incorporated into local government decisions regarding proposed projects.



Specifically, an EIR must discuss the following topics: (1) description of the proposed project; (2) environmental setting without the project; (3) environmental impacts of the proposed project; (4) any adverse environmental effects which cannot be avoided if the proposal is implemented; (5) mitigation measures proposed to minimize adverse impacts; (6) alternatives to the proposed project; (7) the relationship between local short-term uses of man's environment and enhancement of long-term productivity; (8) irreversible environmental changes which would be caused by the project; (9) the growth-inducing impact of the proposed project; and (10) energy-related impacts of the project. After preparation, the report is circulated to interested agencies and the public. It is open to questions, comments and criticism, then revised to reflect the comments and subject to public hearing before acceptance and filing by the appropriate agency.

Notwithstanding the EIR process, various federal, state and local agencies have the authority to review and issue permits for developments proposed for their areas of jurisdiction. The following agencies have permit or review roles in assessing whether a new industry may have excessive adverse effects on their jurisdictions within the bay environment (not all of these agencies necessarily have jurisdiction in every case):\*

\*Primary Sources: J. B. Gilbert & Associates, Environmental Impact Report, Dow Petrochemical Project (August, 1975 Draft); U.S. Army Corps of Engineers, San Francisco Bay Area In-Depth Study, Institutional Inventory, November 1974.

**Water-related jurisdictions:**

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- U.S. Department of Commerce
- U.S. Environmental Protection Agency
- California Regional Water Quality Control Board
- California Department of Fish and Game
- California Water Resources Control Board
- California State Reclamation Board
- California Department of Water Resources
- California State Lands Commission
- San Francisco Bay Conservation and Development Commission

**Air-related jurisdictions:**

- Bay Area Air Pollution Control District

**Land-related jurisdictions:**

- Local (County and City) Planning Department
- Engineering Department
- Water Department or District
- Public Works Department
- Sanitation Department or District



VI. TOWARD A SYSTEM FOR EVALUATING THE TRADE-OFFS  
BETWEEN INDUSTRIAL AND ENVIRONMENTAL SITE  
BENEFITS

A. Situation Where the Significance of  
Water-Related Benefits Become Important

The San Francisco Bay shoreline is an unusually productive resource. To Bay Area residents and visitors, a bayfront location provides access to a rich array of environmental amenities and recreational activities. To the naturalist, the bayfront is the habitat of numerous species of fish, fowl and tidal life. To the industrialist, the bayfront lends access to varied assortments of raw materials from throughout the globe and serves as an economical location for the manufacture and distribution of finished products for distant markets. The bayfront is indeed many things to many people and, thus, must be viewed as capable of a diversity of productive uses.

The present BCDC plan reserves portions of the shoreline for a variety of purposes which are acknowledged to be high priority uses; the areas considered in this report are those that have been designated for water-related industrial uses. The goal of the plan is to allocate the bay shoreline to those uses which will produce the greatest long-run public benefit from the use of the shoreline. Consistent with that goal, and in the light of our analysis, we have concluded that the areas designated for industrial use should generally be retained in that designation and reserved for those uses that meet the augmented definition of water-related industries discussed in Chapter IV of this report.

The above-stated conclusion deals with the planning and permit questions of what industries to grant access to the bay and what areas should be designated for industrial priority use. But, it does not deal with questions that arise when a particular site has non-market environmental benefits that could be lost through industrial use. In many cases, this second type of question is answered by the environmental regulations imposed by the agencies and regulations discussed in the previous chapter. Also, of course, the EIR process may identify negative environmental impacts that the site-using industry will agree to mitigate. However, in other cases, controversies may still arise concerning the degree to which industries should mitigate environmental effects, or, whether or not the industrial use should be placed on a site that does provide significant environmental benefits in its undeveloped state.

Decisions about how much or what types of mitigation to require, or whether or not any water-related industry should be allowed to utilize an environmentally significant site, could be improved if the trade-offs between environmental and industrial use benefit could be identified. The required information would identify the regional costs and benefits that would pertain to each of the available options. For example, in addition to other cost-benefit information, the regional costs and benefits of requiring or not requiring mitigation would be identified and, if the preservation of an ecologically sensitive site is being considered, the regional costs and benefits of prohibiting and allowing development would be identified.

The identification or measurement of the relevant costs and benefits is not equal to the total of the costs and benefits that the industry and the environmental aspects of the site would contribute to the region under each option. Instead, the regional costs of imposing a particular mitigating measure or excluding a water-related industry from a particular site (and the benefits of not doing so) consist only of the job, income and consumer benefits that would be lost to the region as a result of the extra costs imposed on the firm by the measures or its having to move to an inland site (or another shoreline site if one is available). The regional benefits of the mitigation and the costs of allowing the site to be used without the mitigation, would equal the environmental benefits preserved or added because of the mitigation measures or exclusion.

Thus, for example, the regional benefits of allowing the industrial use of a site by a water-related widget-maker would not equal all the jobs, income and consumer benefits of widget production on the site. Instead, those benefits would be equal to only the additional jobs, income, widget price reductions and quality improvements that would result from the difference between the firm's operating on that particular site and its locating inland or on another shoreline site if one is available. The loss of these additional jobs, income-generating activities, and consumer benefits would be the costs of preserving the site. Thus, the costs and benefits of either choice, from the viewpoint of the widget maker, can be identified once the difference between the industrial results of operating on or off the site are identified. Similarly, the costs and benefits of either choice, from the viewpoint of the environmentalist, is equal to the difference between the region's ecological attributes with or without the industrial use of the site.

From both viewpoints, the required information can be identified or measured by considering what would be lost if the site were used by the other use. The jargon of the economist refers to this loss by the term "social opportunity cost". The regional benefits that would be foregone with each use of the site (that is, the social opportunity costs) will vary with the significance of the site to the environment and the operations of the industry seeking the use of the site. In the analysis we have conducted in the course of the research summarized in this report, we have considered an approach to measuring - or at least identifying - the significance of a site to an industrial user. The approach relies upon further analysis of the data required to test whether or not the industry is water-related.

#### An Approach to Identifying the Regional Significance of a Firm's Use of a Bayfront Site

The regional significance of a firm's use of a site and, therefore the costs of excluding the benefits of allowing it to use the site, will vary with the nature of the activity and the industrial and market structure in which it operates and the degree to which it is water-related. The regional significance or social opportunity cost can be identified or measured by analyzing the data submitted by the firm in the light of the following possibilities:

1. If the degree of water-relatedness was great, the activity would not locate in the region if it was serving a broad market within which it could find waterfront locations in other regions. The likelihood that the degree of water-relatedness was great enough to cause this result would increase if the firm's products were sold in a very competitive market. If the activity does locate in another region, the following types of impacts would be generated:



- (a) Consumer choice would decrease and price increase. If the product was bulky or relatively expensive to ship, local consumers and other firms that utilize the product as an input to their output would have to pay more in order to obtain the product.
  - (b) The region would lose jobs and income-generating potential. Such job losses would not only stem from the loss of jobs in the water-related industry, but also from any decrease in the growth of jobs in industries that would buy from or serve the water-related industry.
2. If the water-related activity stays in the Bay Region, but selects an inland site, any one or a combination of the following types of impacts would be generated:
- (a) A reduction in firm profit. If the firm can set its own price, or at least control the price, the inland location may result in some loss of profit to the firm;
  - (b) An increase in the price charged to consumers or other businesses that utilize the firm's products;
  - (c) A decrease in the quality of the product; and
  - (d) A decrease in the jobs and income-earning potential from the firm and those that would sell to or buy from the water-related firm. This result would follow from the decrease in production that would result from a lower quality of demand due to higher prices and/or lowered quality.

#### Recommendation Concerning an Integrated System

The concepts and approach suggested above have not been perfected, nor did our contract call for the development of such concepts and approach. But, our work did lead us to conclude that it would be desirable for BCDC to integrate the analysis of environmental and market or economic factors. We have summarized above the steps we were able to take in that direction. We have not developed a framework for evaluating the significance

of environmental factors that is equivalent to the framework we suggest for identifying the relevant costs and benefits of industrial use. But, we feel this can and should be done. We believe it would be fruitful for BCDC to experiment with the type of trade-off analysis we have outlined above and to develop the environmental equivalent of the industrial component of the system we have alluded to above. The potential pay-off, in terms of better public decision-making, seems great.

## VII. PLANNING GUIDELINES

Our research and analysis lead us to make three types of recommendations, some of which have been discussed in previous chapters. These recommendations are assembled and their implementation reviewed in this chapter.

### A. BCDC Should Continue to Restrict Use of Industrial Priority Use Areas to Water-Related Industries and Revise the Definition of Those Industries

In order to preserve the options that our analysis suggests are needed for water-related industries, we recommend that BCDC retain those areas designated for water-related industry in the San Francisco Bay Plan. Our supply update points out that potential deep water industrial sites are relatively scarce, especially within the area of BCDC jurisdiction. Although the demand for shallow-draft sites is not as great, possibilities of innovation in maritime technology and development of new industries that could benefit from shallow-draft access generally warrant retention of the shallow-draft industrial priority use areas as well.

This study has recommended a revision to the definition of "water-related industry". We suggest that water-related industry be defined as *any activity or firm which gains cost savings or revenue-differentiating advantages, neither of which is associated with land rent or costs, from being located on the waterfront that it could not get from inland sites*. Water-related industry is presently defined in the Bay Plan (p. 17) as being "of many types that require frontage on navigable waters to receive raw materials and to distribute processed materials by ship". This suggested

augmentation is consistent with the current definition except that it also provides for industries which use water in the production process and goes further in applying economic criteria along with the physical criteria contained in the present definition. Under this expanded definition, an applicant would have to show that the proposed activity would truly be economically dependent on use of a bayfront site. The determination that a proposed activity is water-related under the augmented definition of that term should always be the first step in processing an industrial use permit. The required information to make that determination was described in Chapter IV.

B. Some General Comments on Aspects of the  
Bay Plan and Industrial Developments

1. BCDC Should Encourage Shared Access

Whenever possible, new industrial uses of the bayfront should be encouraged to develop facilities that will permit access to the bay to be shared by industrial users of adjacent waterfront and inland sites. The provision of deep-water access facilities that can be shared would have the effect of expanding the supply of usable deep-water sites. In many cases, specific plans for the provision of shared access facilities should be prepared before development is approved. Such plans should not only allow for easements from interior parcels to these facilities, but should delineate a master plan of development, including access routes and other infrastructure, which will minimize the economic and environmental costs of those improvements to all occupants of the site. The information concerning cost differentials that we have suggested BCDC obtain from prospective users in order to evaluate the social benefits that would follow their use of the bayfront can also

be utilized to help judge the degree to which shared access can economically be provided. In all cases, provisions should be made for subsequent users of the access potential provided by the initial user to pay the initial users for any extra costs expended in order to provide the shared access potential.

2. BCDC Should Continue to Encourage Provisions for Public Access

Wherever possible, public access to the waterfront, public uses of recreational and open spaces, and preservation of environmentally sensitive areas should also be incorporated into specific plans for industrial sites. In many cases, waterfront sites with industrial potential need not be developed so that they can provide social benefits from only industrial use or from the public enjoyment of environmental amenities. Planning can permit both benefits to be obtained from the same location.

3. BCDC Should Allow Interim Uses of Sites So Long as Industrial Development Opportunities Can be Preserved

Interim uses of sites within water-related industrial priority use areas should be allowed only where the proposed use would not result in the alteration of the site in a manner that might make it inappropriate for future industrial use and the use would not require significant capital investment in fixed facilities that would then present an economic barrier to future industrial development of the site.

#### 4. BCDC Should Initiate Coordination With Other Land Use Planning Agencies

Since BCDC jurisdiction is limited to the area within 100 feet of the high water line, adherence to the priority use designations and planning guidelines depends upon the cooperation of agencies with jurisdiction over designated priority use areas outside BCDC jurisdiction. Short of requesting additional authority, BCDC should continue to cooperate with other agencies in reserving shoreline parcels for water-oriented industrial use.

#### C. Study Further the Integrated Approach to Considering Environmental and Industrial Values

In their planning activities, BCDC should experiment with and further study the integration of information concerning the values of industrial development and the mitigation or preservation of environmental site values. We have suggested the general nature of such an integrated approach in Chapter VI of this report. However, while the work we have completed does provide a sketchy framework for identifying and evaluating industrial values, we have not provided a comparable framework for identification and evaluation of the relevant environmental values. We believe this can and should be done.

Once this is done, the preservation of environmentally sensitive areas, or the mitigation of negative environmental impacts, could be weighed against the loss of economic benefits that would result from the imposition of added costs or the prohibition of water-related industrial development on a particular site. In some cases, the commission may want to deny the water-related industrial use because they judge the environmental

benefits significantly outweigh the industrial use benefits. In other cases, the industrial activity will generate such large benefits in relation to the environmental benefits that the industrial use will be approved without further consideration of environmental factors other than those discussed in Chapter V. But, in most cases, the process should search for a middle ground. Information from an analysis of information from the industries, the steps listed above, the environmental impact report, and other sources can be used to identify ways of mitigating potential environmental damages and enhancing the public utility of existing amenities. To the degree that such measures increase the industry's per-unit costs, they do, of course, tend to reduce the benefits of the industrial activity.

The degree to which such increased costs would reduce the income, job and consumer choice benefits of the industry would be approximated. Let us consider the position of a firm that provides cost information (per-unit) of the type diagrammed in Figure 1.

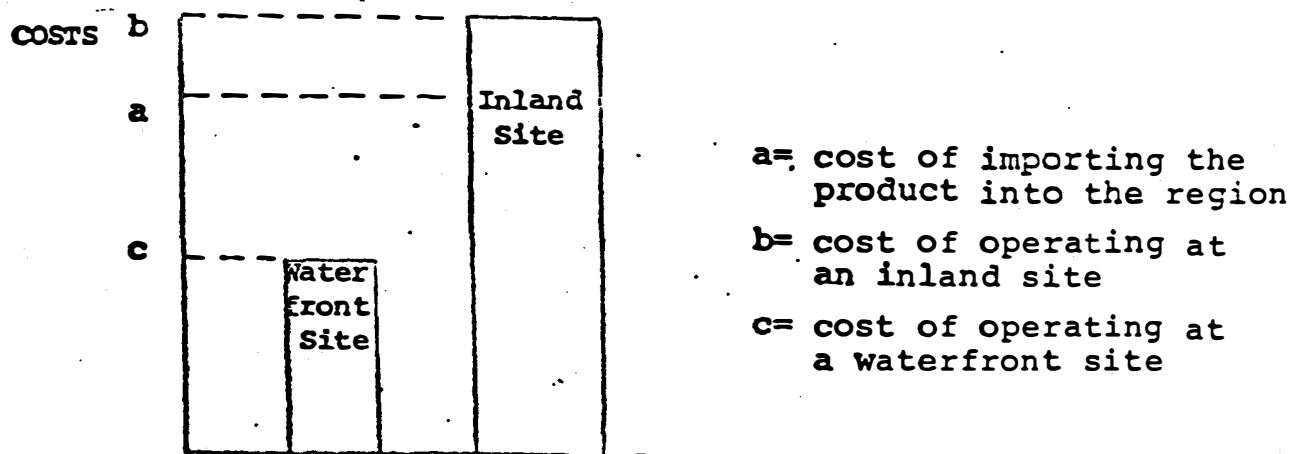


FIGURE 1  
Information Relevant to Estimates of Industrial Values

When (a) is the cost of importing the product into the region, then the industry would not locate at an inland site because their costs (b) would be above the import costs. When the costs of importing the good is above (b), the industry would probably be able to locate at an inland site within the region.

In our example, the cost of mitigation measures could not exceed the cost of line (a) or it would be more uneconomical for the firm to locate in the region. Less costly mitigation measures may reduce the environmental cost of industrial development, but the cost of these measures will have impacts on the regional economy, to a lesser degree but in the same manner as denial of the permit, and their significance should be evaluated similarly. In many cases, consideration of these factors can lead to a trade-off between economic and environmental benefits that will provide the region with some of each.



# APPENDIX A

## PERSONS CONTACTED

<u>AGENCY OR FIRM</u>	<u>PERSON, TITLE</u>	<u>DATE</u>
Association of Bay Area Governments	P. Knepper, Cartographer D. Wambem, Regional Planner	January/March, 1976 January/March, 1976
Southern Pacific Industrial Development Co.	D. T. Daggett, Vice President and General Manager	January, 1976
Pacific Gas and Electric	C. Brune, Jr., Manager Area Services D. Chambers, Director, Industrial Services	January, 1976 January, 1976
Solano County Industrial Development Agency	F. R. Henrekin, Consultant	January, 1976
Contra Costa County Development Association	P. Hughey, General Manger	January, 1976
San Francisco Bay Area Council	A. Siracusa, Vice President	January, 1976
Dow Chemical Company	R. E. Perry, Hydrocarbon Project Coordinator W. H. Lamm, Transport Manager	January, 1976 January, 1976
Exxon Company, Benicia	M. Sprigg, Refinery Manager	January, 1976
Shell Oil Company, Martinez	M. S. Waller, Staff Engineer	February, 1976
Union Oil Company, Rodeo	William Stark, Plant Manager	February, 1976
Allied Chemicals, Pittsburg	John Andrews, Assistant Plant Manager	February, 1976
U.S. Steel Corporation, San Francisco	Stuart Bennett, Executive Assistant to Vice President William Thompson, Public Relations	February, 1976 February, 1976
Bethlehem Steel Corporation, South San Francisco	D. H. Miller, General Manager R. B. Mayhugh, Asst. General Manager	February, 1976 February, 1976
Peter Kiewit Sons' Co., Richmond	R. E. Millard, District Engineer	February, 1976,
Kaiser Steel Corporation, Oakland	Bill Carson	February, 1976
C&H Sugar Company, San Francisco	William Stewart, Vice President C. W. Godderham, Jr., Manager, Distribution	February, 1976 February, 1976
Con-Agra Montana, Oakland	Harvey A. Johnson	February, 1976

PERSONS CONTACTED (Cont'd.)

AGENCY OR FIRM	PERSON, TITLE	DATE
Crown Zellerbach Corporation, Antioch	Charles E. Young, Resident Manager George E. Rogers, General Supervisor of Services	February, 1976 February, 1976
Cal Gas Corporation, Sacramento	John R. Wheaton, Vice President Development and Planning	February, 1976
Cal Gas Terminals, Selby	Robert E. Drew, Vice President	February, 1976
National Gypsum Company, Richmond	David Steel, Plant Manager	February, 1976
Tidewater Sand and Gravel, Oakland	J. Peterson, Manager	February, 1976
Rhodes and Jamieson, Oakland	B. Downing, Manager	February, 1976 February, 1976
Isobar, Inc., Benicia	Howard L. Jenkins, Property Manager	February, 1976
Benicia Industries, Benicia	Alfred Wanger, Vice President Joseph L. Dudziak, Director	February, 1976 February, 1976
Contra Costa County Planning Department	Charles A. Zahn, Planning Coordinator James Cutler, Project Planner Arnold Jonas, Senior Planner Heinz Fenischell, Assistant Planning Director	February, 1976 February, 1976 February, 1976 February, 1976
Solano County Planning Department	David Hubbell, Planner III	February, 1976
City of Vallejo	Ted A. MacDonell, Assistant City Manager	February, 1976
City of Martinez	Barry Whittaker, Planning Director	February, 1976
Mare Island Naval Support	Lt. J. J. Matthews, Public Works Officer	February, 1976
City of Hercules	Ralph Snyder, City Manager	February, 1976
Concord Naval Weapons Station	Al Campaglia, Public Affairs Officer	February, 1976
Mare Island Naval Shipyard Command	Ms. Calvert, Public Affairs Officer	February, 1976
Sonoma County Planning Dept.	B. Poca, Planner II	March, 1976
T. A. Nilson, Industrial Realtor	T. A. Nilson	February, 1976

PERSONS CONTACTED (Cont'd.).

<u>AGENCY OR FIRM</u>	<u>PERSON, TITLE</u>	<u>DATE</u>
Marine Exchange	Len Silver	February, 1976
Regional Water Quality Control Board	Griff Johnston	February, 1976
Port of San Francisco	Don Taggert	February, 1976
U.S. Army Corps of Engineers	James Link	February, 1976



APPENDIX B  
BIBLIOGRAPHY

Biederman, Nicholas P., "LNG Barges May Solve Many Problems,"  
Pipeline & Gas Journal, 199:90+, June, 1972

Carter, L.J., "Deepwater Ports: Issues Mix Supertankers,  
Land Policy," Science, Volume 181, No. 4102, August, 1973,  
pp. 825-828

Chemical Week, "Chemicals Barge Ahead," 108:15, June 30, 1971

Chemical Week, "Gasification Stokes the Fire Under Coal's  
Comeback: 113:41-2+, March 11, 1974

Chemical Marketing Report, "Coal in Power Plants: High Ecology  
Hurdles," 202:7, December 25, 1972

Chemical Marketing Report, "Chemical's LP Gas Use Up 9.4 Percent,"  
203:4, January 1, 1973

City of Hercules, 1990 General Plan, April 1975

City of Martinez, General Plan

City of Martinez, Zoning Map

Contra Costa County Planning Department, Composite Land Use  
Plan, 1976

Dixon, James M., "By Water to the World," Distribution World-  
wide, 72:40-7, August, 1973

Duthiewicz, Bronek, "Methanol Competitive with LNG on Long  
Haul," Oil & Gas Journal, 77:166-7+, April 30, 1973

J. B. Gilbert & Associates, Draft Environmental Impact Report,  
Dow Petrochemical Project: Pittsburg Expansion,  
August, 1975

Gruen Gruen + Associates, and Sedway/Cooke, Approaches Towards a Land Use Allocation System for California's Coastal Zone, Report to The Department of Navigation and Ocean Development of the Resources Agency, State of California, October 22, 1971

Gruen Gruen + Associates, An Analysis of the Relationship Between the Port of San Francisco and the Economy of the City and Bay Region, A Report to The Economic Subcommittee of The San Francisco Mayor's Port Committee, June 21, 1972

Hallanger Engineers, California Liquid Gas Corporation, LPG Marine Terminal and Tank Farm Recommendations, June, 1975

Hallanger Engineers, Inc., Urich Oil Company, Draft Environmental Impact Report for 30,000 GPD Fuel Refinery, Martinez, February, 1975

Harris, Dr. W. D., and Davison, Dr. R.R., "Methanol from Coal Can Be Competitive with Gasoline," Oil & Gas Journal, 71:70-2, December 17, 1973

Industry Week, "Coal Industry Facing New Problems, Markets," 173:16+, May 15, 1972

Industry Week, "Ocean Mining Seen Feasible by 1980," 175:31+, December 4, 1972

Jones/Stokes Associates, Inc., EDAW Inc., and California Department of Fish and Game, Fish and Wildlife Element, Suisun Marsh Protection Plan (1975)

Parson, Daniel, "How Will Imported LNG Fit U.S. Energy Needs?" Pipeline & Gas Journal, 199:56+, September, 1972

Scheibla, Shirley, "Conversion Premium: Utilities Find Coal Expensive and Scarce," Barrons, 54:9+, March 11, 1974

Swan, D. A., "The Potential of Manganese Nodules as a Future Mineral Resource," Marine Technology, January, 1974 pp. 31-33

U.S. Army Corps of Engineers, San Francisco Bay Area In-Depth Study, Channels, Ports and Related Facilities Inventory (June, 1973)

U.S. Army Corps of Engineers, San Francisco Bay Area In-Depth Study, Institutional Inventory, Preliminary Draft (November, 1974)

U.S. Army Corps of Engineers, San Francisco Bay Area In-Depth Study, Waterborne Commerce Projections and Commodity Flow Analysis for the San Francisco Bay Region, Draft (November, 1975)

U.S. Department of Commerce, Domestic and International Business Administration, U.S. Industrial Outlook, 1975

U.S. Environmental Protection Agency, Office of Air and Water Programs, Effluent Guidelines Division, Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Cane Sugar Refining Segment of the Sugar Processing Point Source Category (December, 1973)

U.S. Environmental Protection Agency (distributor), Noise and You (1973 ed.)

U.S. Environmental Protection Agency, Office of Air and Water Programs, Effluent Guidelines Division, Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Steel Making Segment of the Iron and Steel Manufacturing Point Source Category (June, 1974)

U.S. Environmental Protection Agency, Office of Air and Water Programs, Effluent Guidelines Division, Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category (December, 1973)

